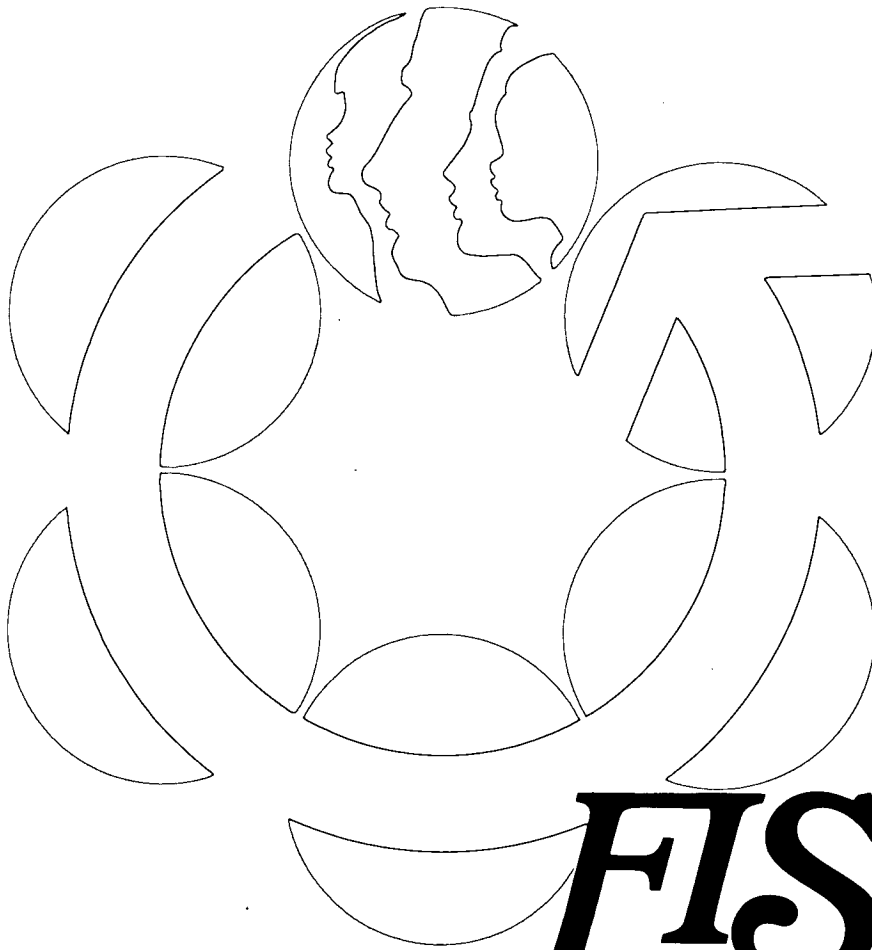


RM Wrench



second
annual
**GROWTH
POLICY**
report *APPENDIX*
of
the
MONTGOMERY
COUNTY
PLANNING
BOARD
september
1975

FISCAL

IMPACT ANALYSIS

The Maryland-National Capital Park and Planning Commission is a bi-county agency created by the General Assembly of Maryland in 1927. The Commission's geographic authority extends to the great majority of Montgomery and Prince George's Counties: the Metropolitan District (for parks) comprises 919 square miles in the two counties, while the Regional District (for planning) includes 1001 square miles.

The Commission has three major functions: (1) the preparation, adoption, and from time to time, amendment or extension of the General Plan for the physical development of the Maryland-Washington Regional District; (2) the acquisition, development, operation, and maintenance of a public park system in the Maryland-Washington Metropolitan District; and (3) in Prince George's County, the operation of the entire County public recreation program.

The Commission operates in each County through a Planning Board, appointed by and responsible to the County Council. All local plans, recommendations on zoning amendments, administration of subdivision regulations, and general administration of parks are responsibilities of the Planning Boards.

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

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IMPACT ANALYSIS

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Chapter ***four***
Methodology & Mathematics

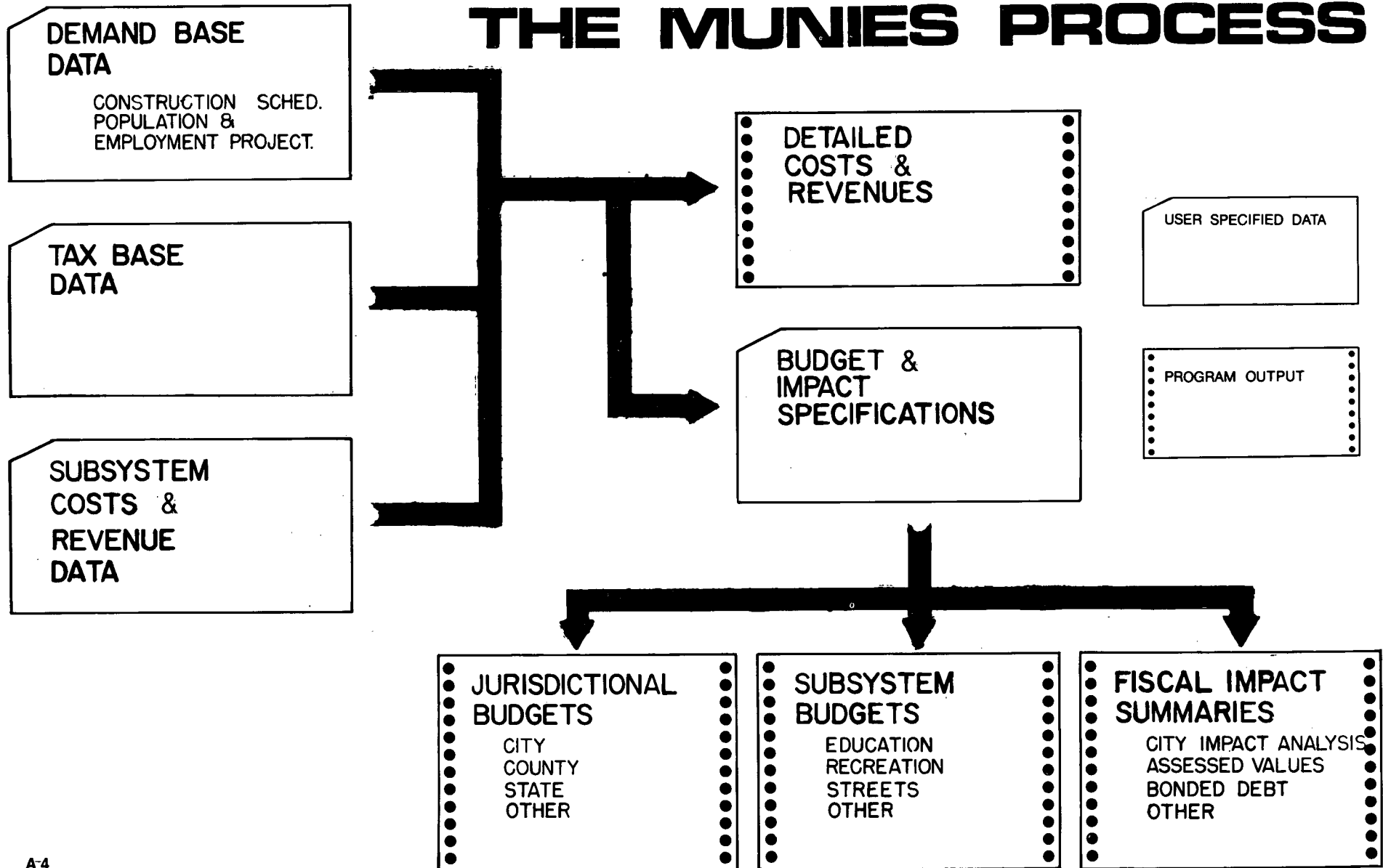
Chapter Four

M E T H O D O L O G Y A N D M A T H E M A T I C A L F R A M E W O R K

- I. The Research Division of the Montgomery County Planning Board has recently obtained from Marcou, O'Leary & Associates, urban planning consultants, a computer-based program for use in fiscal impact analysis. This program called MUNIES, developed by the Urban Systems Division of Westinghouse Corporation, has been used successfully across the country in a number of fiscal impact studies. It is essentially a computerized accounting system that can handle the thousands of separate calculations necessary in evaluating county budgets and the costs and revenues associated with impacts of new development.

The following diagram summarizes the MUNIES (Municipal Impact Evaluation System) process in terms of user specified input data and possible program outputs.

THE MUNIES PROCESS



MUNIES can provide decision makers with fiscal impact information on major development proposals such as:

- . General Planning Policy and Growth Policy
- . Community Master Plans
- . Sector Plans and CBD Plans
- . Large Scale Residential, Commercial and Industrial Projects.

The fiscal impacts can be calculated for a period of up to 20 years, and on an individual yearly basis. They include:

- . Costs and revenues generated by the development or plan
- . Property tax rate required to balance costs and revenues
- . Bonded indebtedness required to finance capital facilities
- . Level of service attainable at various tax rates.

Application of MUNIES requires certain input data such as:

- . Planned number, type and value of dwelling units
- . Planned commercial and industrial acreage, square footage and value
- . Associated population
- . Capital facilities (if part of CIP).

This information is combined with additional information stored in the MUNIES model computerized data files representing county-wide standards or averages concerning level of service (e.g. people/park, students/school, students/teacher, assessed value/fire station, etc.). The source of the "levels of service information" includes the

adopted 6-year CIP of the County, the 6-year Public Services Program, as well as other County sources as explained in Chapter Five of this report.

The entire input to the model is developed manually by the staff of the Planning Board. MUNIES is a straightforward arithmetic analysis process which combines manual and computer techniques. MUNIES uses data manually developed from community plans, growth forecast, and previous studies undertaken on growth policies such as the TRIMS transportation tests. Using this data, the computer component of MUNIES calculates information regarding tax rates, bond payments, costs and revenues by subsystem (departments and agencies of government), and other related information. Based on this information reports are printed out by computer analyzing the fiscal impact of the development alternative being tested.

The MUNIES model became operational on the County's equipment by May 1, 1975. The model is basic in scope and required a period of only three months before the initial output data was produced at the beginning of August. Since the basic input data is now stored in the model, future applications can be accomplished in much less time. Some future refinements may be necessary based upon operational experience and the changing informational requirements of the decision-making process. These can be made by the Planning Board's staff.

To date the model has been used in the growth policy analysis of the fiscal impact of alternative 10-year growth rates, the results of which are included in this report. Three major alternative production capabilities of MUNIES include:

1. Impact analysis of specific development proposals
2. Use during the formulation and review of specific area master plans or sector plans
3. Analysis of various sensitivity/policy issues such as level of service, phasing of development projects, rate of growth, and density of development.

Because MUNIES employs the computer to do high-speed computations, sensitivity analysis involving multi-variables is facilitated that would not be feasible otherwise.

II. Operational Steps

The application of MUNIES to evaluate the fiscal impact of alternative growth rates was accomplished in the following steps:

- A. Data was collected describing each growth scenario, cost and revenue parameters, and level of service standards for each public facility subsystem (see Chapter Five).
- B. A method of analysis was selected from those provided by the MUNIES model and this determined the output reports (budgets) required for manual analysis.
- C. Computer data files were prepared based on the results of Steps A and B and reviewed.
- D. The computation portion of the analysis was performed using the data files of Step C and the MUNIES program.
- E. The output reports resulting from Step D were manually analyzed.

- F. Since five alternative growth rates were to be analyzed, Steps A-E were repeated for each of the alternatives.
- G. A written report was prepared using the fiscal impact reports from Step E.

The budget summaries for the five alternatives tested are included in Chapter Two of this report.

Input

Two basic types of data are used as input to the analysis process. Development data describe the growth alternative being tested. This data was generated from previous population-employment studies by the Planning Board. County service level standards describe the service, cost and revenue parameters used in the analysis. This data was obtained from documents such as the County Adopted FY 1976 Budget, the CIP and PSP and observation of past trends and actual practices. For a more complete description of service level standards and assumptions data, see Chapter Five of this report.

A number of development data categories were used as input, and most were externally generated from the analysis from available documents. Data from any remaining categories was internally generated from additional community standards data during the analysis. Development data categories include:

1. Population (by age group)
2. Employment (by private, public)
3. Commercial Land Use
4. Industrial Land Use

5. Residential Development (single-family, multi-family)
6. Assessed Valuation
7. Programmed Capital Facilities and Costs
8. Students (by subarea)
9. Revenues
10. Tax Rates
11. Operating Costs
12. Intergovernmental Transfer Payments

Output and Reports

Three basic types of data are provided as output from the analysis process used for the growth alternative study. These include revenue summaries, subsystem trend budgets and operating budget summary and impact analysis. Data is provided on an annual basis during the 10-year analysis period starting with Fiscal Year 1976 through FY 1985. The summary reports are included in Chapter Two; Runs 1-5 are included, one for each growth rate analyzed.

The output data categories are listed below:

1. Taxable Values
2. Non-Property Tax Revenues
3. Total Property Tax Revenues
4. Capital Expenses by Subsystem
5. General Obligation Indebtedness by Subsystem
6. Operating Expenses by Subsystem
7. Tax and Other Revenue by Subsystem
8. Tax Rate Required
9. Bonded Debt
10. Bonding Capacity
11. Bonding Margin
12. Surplus or Deficit

Complete flexibility in report generation is possible with the model since report formats and components are specified as inputs to the computer program. Since various County tax rates are applied to separate assessment classes and not county-wide, it was necessary to produce separate fiscal impact summaries for the M-NCPPC Budget, Fire Station Budget and WSSC Water and Sewer User Charges, which are applied to water and sewer consumption rates only.

III. Data Assumptions

As is the case in any cost/revenue study, the results or "bottom line" is dependent on the original cost and service level assumptions that went into the study. As previously indicated, the computer component of MUNIES is merely an accounting system that in essence adds, subtracts, multiplies, etc., at a high rate of speed. It performs numerous bookkeeping operations to obtain the annual costs and revenues across the forecast period. Consequently, the quantitative output provided by MUNIES analysis is only as accurate as the specified analysis process and the data used as input to the model.

A. Data Sources and Verification

The primary data sources used in the study consist of County documents, such as: previous and current year operating budgets, 6-year CIP and PSP, published reports from the Finance Department such as a recent Bond Prospectus, School Board publications such as the 6-year CIP for schools, and the report of the Small Schools Task Force, and other miscellaneous County documents. Additional data was obtained directly from County staff people regarding construction costs, operating costs or levels

of service standards. Where possible, statistical regression analysis was used to project costs and revenues. Where data did not exist, simple linear relationships were used extensively (e.g. per capita, per acre, per dwelling unit, etc.). Most of these relationships were computed manually by the staff, however some were computed internally by the model.

At the conclusion of the staff analysis, the Planning Board, during a series of meetings in June, 1975, specifically reviewed the assumptions used to determine the costs and levels of service for various subsystems (County departments and agencies). The Planning Board also reviewed and approved assumptions used to forecast future revenues, bond rates and tax rate assumptions. Earlier, the Planning Board (in May, 1975) reviewed and approved the development data (i.e. population, employment, dwelling unit growth rates) to be tested by the model. Chapter Five of this report explains in detail the derivation of the various data inputs to the fiscal impact analyses.

Chapter five *Data Assumptions*

Chapter Five

DATA ASSUMPTIONS

I. ALTERNATIVE GROWTH ASSUMPTIONS

This section of the report will outline the following topics:

- | | |
|----------------------------|----------------------|
| A. Subarea Assumptions | D. Demographic Model |
| B. Residential Development | E. Employment Growth |
| C. Population Growth | |

A. Subarea Assumptions

1. Fiscal Analysis Areas

It was necessary to divide the County into a number of subareas to measure variation in costs and revenues associated with different growth patterns. Given time and computer limitations, a breakdown of the County into four (4) subareas was considered to be most manageable. The areas used are shown in Figure A-1; they are called "Fiscal Analysis Areas." The Fiscal Analysis Areas generally follow Planning Area boundaries, which are the principal areal units used by the Commission for data collection and analysis. The demand and tax bases for each alternative contain separate data for each Fiscal Analysis Area. In using the Fiscal Analysis Areas the following assumptions were made:

- a. The revenue per revenue unit (new dwelling units, new commercial floor area, etc.) is the average for the Planning Areas within each Fiscal Analysis Area.

- b. Both the demand for public services and the existing capacity of public facilities is homogeneous within each Fiscal Analysis Area and differs between areas.
- c. The average cost of public services and capital improvements is the same within each Fiscal Analysis Area.

Note: In some cases it was not possible to disaggregate costs or revenues by Fiscal Analysis Areas. In such cases costs or revenues were simply given a county-wide designation.

2. Up-County/Down-County Areas

Alternatives 1, 2 and 3 differ in the location of growth but not by the timing or the total amount of growth. All three alternatives use the Planning Board's trend forecast for total growth. Figure A-2 shows the up-county vs. down-county delineation used for testing purposes. This division has been used in the past by the Planning Board for transportation modeling. The down-county area includes the Metro Impact Areas except for Shady Grove. For alternatives 1, 2 and 3, the location of growth was shifted between the I-270 Corridor and the down-county area. It was assumed that the limited growth assigned to the Wedge area in alternative one (1) would not vary in alternatives 2 and 3.

3. Establishing the Basic Location of Growth

For each alternative the first step in the process of locating growth was to find all the areas able

to accommodate growth on a set of 3000 scale maps. Next, given the total amount of growth assigned to each alternative, maps were produced which pinpoint as close as possible the Staff's best judgment as to where growth would likely occur. The process involved a thorough analysis of existing and proposed land use, zoning, public facilities, and market forces. A total of twenty (20) maps were developed--four (4) maps for each alternative. A map was made for 1980 and 1985 for both population and employment growth. The resulting data was transformed to tabular form for Planning Areas, Drainage Basins, and Fiscal Analysis Areas. Data was introduced to the MUNIES model at the Fiscal Analysis Area level.

B. RESIDENTIAL DEVELOPMENT

1. Dwelling Units

- a. The dwelling unit was the basic unit used to generate total population and population characteristics for each alternative. The ten year trend forecast of 70,000 dwelling units was used for the first three alternatives. Seventy thousand (70,000) is slightly less than the 72,377 dwelling units which were built in Montgomery County in the last ten (10) years.
- b. In worksessions with the Planning Board it was agreed that reasonable ten year construction rates for the high and low alternatives would be 92,000 and 33,000, respectively. The high construction rate would allow a

population growth rate of approximately 21,000 per year, which matches the highest rates of the 1960's. The low construction rate would permit a population growth rate of approximately 5,000 persons per year. It was judged that, given zoning, public facilities, legal and market conditions, the high and low growth rates represented the maximum extremes possible over the next ten (10) year period.

- c. After examining past cyclical changes in the construction cycle and current economic forecasts, it was decided that for each alternative the growth would be lower in the first part of the decade than in the second five year period.

2. Alternative Scenarios (See Table A-1)

a. Trend Growth

The trend growth represents Staff's best judgment on the projection of the amount and location of future growth, given past and current economic and demographic conditions, public facilities, zoning, and land use.

b. Down-County Weight

- (1) The trend forecast allocates approximately 56,000 dwelling units over the ten year period to the up-county and down-county areas which are shown in Figure A-2. The remaining 14,000 dwelling units are allocated to the Wedge areas.

- (2) For alternative #2 the down-county area is allocated 70% of total urban development--39,000 dwelling units. This compares to 17,000 units for the up-county area. The 70/30 split is judged to be maximum difference likely to occur between the two subareas, given market conditions, public facilities, zoning, and land use, and the forecast growth rate of 70,000 dwelling units.

c. Up-County Weight

As in alternative #2, the Wedge area received the same amount of growth as in alternative #1. The up-county area in this alternative received 70 percent of the urban development.

- d. This effectively is a "no growth" alternative. The 33,000 dwelling units over a ten (10) year period would represent the likely minimum development rate for the County. Only current development commitments were allowed for the down-county area. The approximately 5,000 existing dwelling unit commitments would provide almost no additional development in the Metro Impact Areas. Only 12 percent of the development would take place down-county.
- e. This alternative is designed to show the impact of high growth rate both up-county and down-county. The high up-county weight of alternative #3 is combined with the high down-county weight of alternative #2.

3. Dwelling Unit Mix

a. Alternatives 1, 2, 3

For the trend growth an analysis was made of the likely future development mix, given current market and demographic trends. Single-family units (including townhouses) are expected to retain their current share of the market during the ten year period--approximately 54%. However, the current softening of multi-family demand and market supply problems will likely lead to a single-family share of close to 60 percent for the first five (5) year period. This latter trend was also assumed for alternatives 4 and 5.

b. Alternative 4

This alternative has a greater percentage of single-family homes--83%--since most of the development is taking place up-county and in the Wedge areas.

c. Alternative 5

This alternative has the greatest percentage of multi-family units--53 percent. The high development rate would require a large percentage of multi-family units. In the past, most of the fluctuations in Montgomery County growth rate were due to changes in the rate of multi-family development.

C. POPULATION GROWTH (See Tables A-2, 3, 4, 5, 6)

Differences in level of population growth for each alternative were determined by the number and type of dwelling units constructed. Although total County population increases for each alternative, actual population declines are shown during certain periods for specific Fiscal Analysis Areas depending upon the alternative. In general this occurs because of the declining average household size in Fiscal Analysis Areas I and II and in some alternatives. New population growth per new dwelling unit is lower during the first five year period in each alternative. This is due to the current demographic characteristics of Montgomery County. Average household size will fall faster in the first five year period since a larger percentage of young adults will be leaving home to form new households than in the second period.

D. DEMOGRAPHIC MODEL

A method was needed to transform assumptions regarding the level of residential construction, location, and the dwelling unit mix into population by age. Staff developed a computer model to perform the many calculations which were necessary. The basic model inputs were projections of future construction rates by dwelling unit type and current estimates of population by age and sex. The model used a traditional cohort survival routine to apply mobility statistics from the Census Update Survey, and current statistics on deaths and fertility to project future subarea populations by age and sex. (See Chart A-1)

E. EMPLOYMENT GROWTH (See Tables A-7, 8, 9, 10, 11)

1. Control Totals

The trend forecast of 100,000 at-place jobs was used for the first three alternatives. Alternatives 4 and 5 were allocated 30,000 and 130,000 jobs, respectively, to illustrate the impact of constrained vs. a very high level of employment growth.

a. Alternatives 1, 2, 3

The location of new jobs is more constrained by existing patterns of development than is the location of new housing. Most firms prefer to grow near their existing locations. Growth occurs in small increments and space is added accordingly. A need for large new accommodations often is met by a move to a different state or region. Over the next ten years most of Montgomery County's employment growth will be generated by existing employers; this is a principal reason why the employment location pattern is expected to vary only slightly.

b. Alternative 4

Employment growth is severely limited for alternative 4. Only 10 percent of the 30,000 jobs would be located in the down-county area. The combination of a low growth rate and restricted down-county growth would alter the character of future employment. The County

would lose its percentage share of regional office employment and retail employment growth.

c. Alternative 5

This high growth rate of 130,000 jobs will provide a level of employment growth consistent with population growth. The allocation of growth would follow likely market forces. Office employment growth would remain primarily down-county. New growth in the up-county area would be primarily retail and industrial.

FIGURE A-1

AREAS FOR FISCAL ANALYSIS

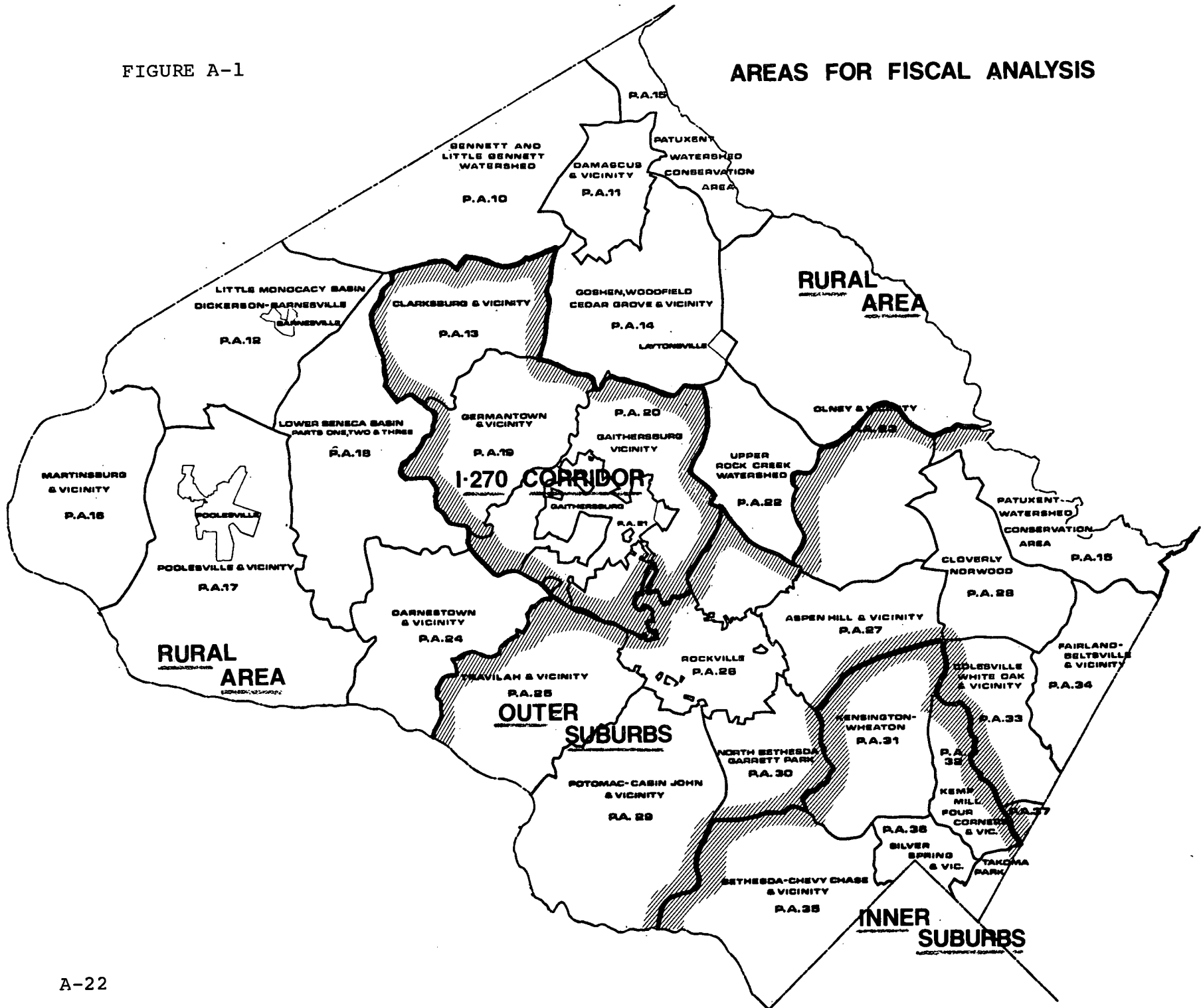


FIGURE A-2

POPULATION/EMPLOYMENT ALLOCATION AREAS

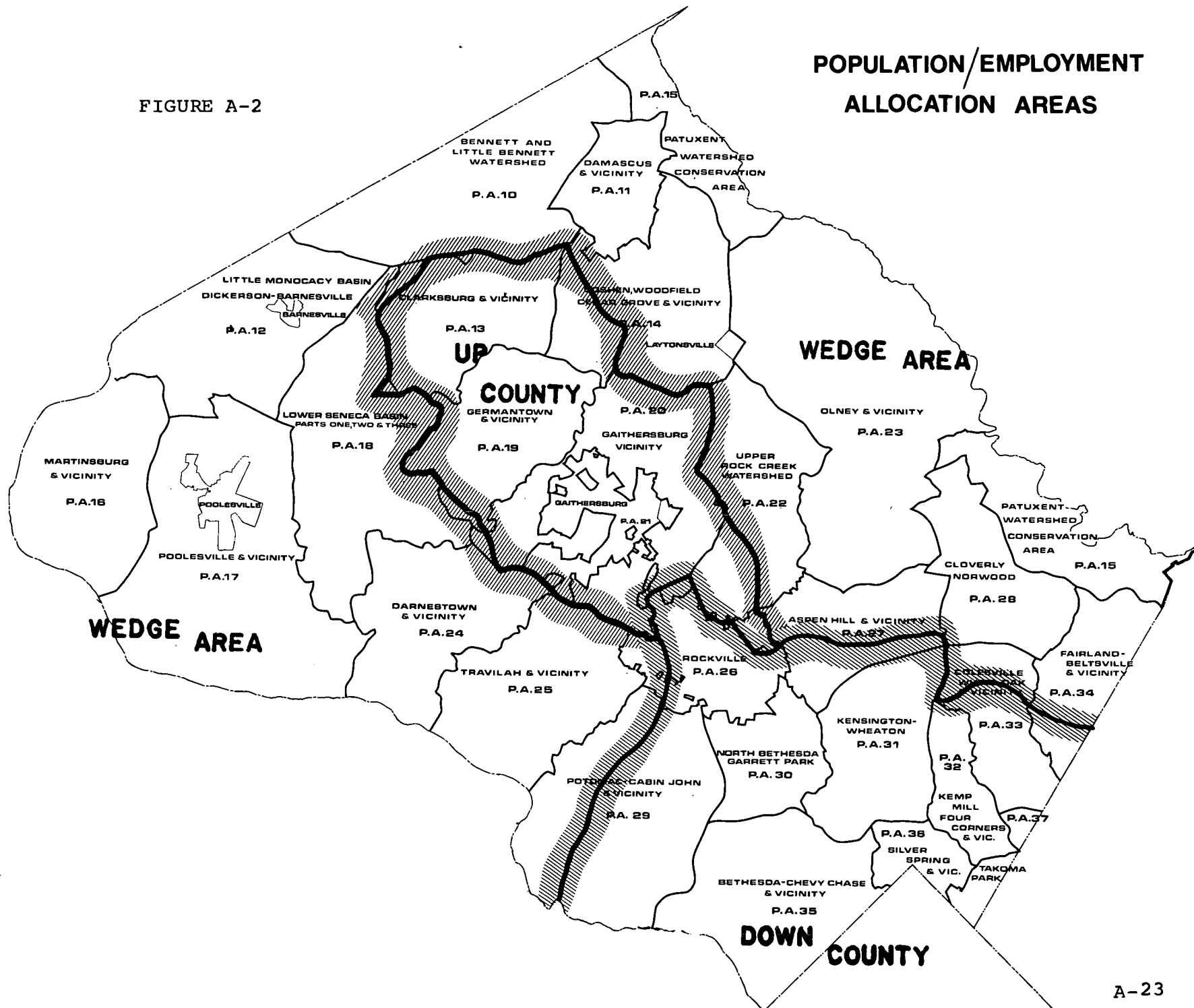


TABLE A-1

COUNTY-WIDE CONTROL TOTALS FOR ALTERNATIVE SCENARIOS

	<u>Population</u>		<u>Total D.U.</u>		<u>Single-Family</u>		<u>Multi-Family</u>		<u>Employment</u>	
	<u>Total</u>	<u>Annual Change</u>	<u>Number</u>	<u>Occupied</u>	<u>Number</u>	<u>Occupied</u>	<u>Number</u>	<u>Occupied</u>	<u>Total</u>	<u>Annual Change</u>
1975	589,600		193,770	189,897	129,400	127,459	64,370	62,438	243,000	
<hr/>										
Alternatives (Run number)										
<u>Trend (1, 2, 3)</u>										
1980	644,600		225,770	220,773	148,400	146,175	77,370	74,598	288,000	
1985	739,600		263,770	257,392	167,400	164,554	96,370	92,838	343,000	
<hr/>										
Change 75-80	55,000	11,000	32,000	30,876	19,000	18,716	13,000	12,160	45,000	9,000
Change 80-85	95,000	19,000	38,000	36,619	19,000	18,379	19,000	18,240	55,000	11,000
<hr/>										
Change 75-85	150,000	15,000	70,000	67,495	38,000	37,095	32,000	30,400	100,000	10,000
<hr/>										
<u>Low Growth (4)</u>										
1980	604,000		210,270	207,509	144,400	142,956	65,870	64,553	263,000	
1985	639,200		226,770	223,804	156,900	155,331	69,870	68,473	273,000	
<hr/>										
Change 75-80	14,400	2,880	16,500	17,612	15,000	15,497	1,500	2,115	20,000	2,000
Change 80-85	35,200	7,040	16,500	16,295	12,500	12,375	4,000	3,920	10,000	1,000
<hr/>										
Change 75-85	49,600	4,960	33,000	33,907	27,500	27,872	5,500	6,135	30,000	3,000
<hr/>										
<u>High Growth (5)</u>										
1980	665,200		233,770	227,502	150,900	147,947	82,870	79,555	301,500	
1985	799,600		285,770	277,852	172,400	169,017	113,370	108,835	373,000	
<hr/>										
Change 75-80	75,600	15,120	40,000	37,605	21,500	20,488	18,500	17,117	58,500	11,700
Change 80-85	134,400	26,880	52,000	50,350	21,500	21,070	30,500	29,280	71,500	14,300
<hr/>										
Change 75-85	210,000	21,000	92,000	87,955	43,000	41,558	49,000	46,397	130,000	13,000

TABLE A-2

Alternative #1 Trend (Existing Zoning & Market) TOTAL---	1975		1980		1985	
	D.U.'s	Pop.	D.U.'s	Pop.	D.U.'s	Pop.
1. INNER SUBURBS	95,857	268,650	98,180	264,700	111,360	300,000
PA 31 Wheaton	25,923	82,970	26,720	82,170	28,220	87,670
32 Kemp Mill	11,213	35,170	11,410	34,440	13,210	40,280
35 Bethesda	32,876	90,460	34,140	90,230	36,880	98,440
36 Silver Spring	15,405	33,740	15,420	32,450	22,410	47,630
37 Takoma Park	10,440	26,310	10,490	25,410	10,640	26,030
2. OUTER SUBURBS	70,301	234,010	83,250	249,000	96,550	277,800
PA 23 Olney	5,377	18,280	6,380	19,550	7,430	21,990
25 Travilah	2,042	7,210	2,330	7,420	3,790	11,660
26 Rockville	14,972	48,850	17,720	52,080	18,970	53,860
27 Aspen Hill	13,388	46,800	15,620	49,150	17,020	51,720
28 Cloverly	2,709	9,450	3,480	10,950	3,810	11,570
29 Potomac	8,974	35,170	10,430	36,860	11,120	37,980
30 N. Bethesda	11,050	31,350	13,240	33,890	18,750	46,370
33 White Oak	9,099	28,500	9,980	27,650	10,670	29,080
34 Fairland	2,690	8,400	4,070	11,450	4,990	13,570
3. I-270 CORRIDOR	19,552	59,660	34,460	98,600	43,350	121,500
PA 13 Clarksburg	578	2,090	880	2,880	1,380	4,350
19 Germantown	1,520	5,510	8,060	26,540	12,520	39,920
20&21 Gaithersburg	17,454	52,060	25,520	69,180	29,450	77,230
4. RURAL AREA	8,060	27,280	9,890	32,300	12,510	40,700
PA 10 Bennett	841	2,730	1,010	3,110	1,180	3,690
11 Damascus	1,187	3,810	1,390	4,320	1,980	6,230
12 Dickerson	342	1,220	390	1,350	420	1,440
14 Goshen	1,115	4,150	1,420	5,130	1,720	6,150
15 Patuxent	929	3,520	980	3,590	1,200	4,380
16 Martinsburg	55	200	80	280	110	360
17 Poolesville	892	2,600	1,220	3,440	1,670	4,690
18 Lower Seneca	485	1,730	540	1,840	600	2,130
22 Rock Creek	1,222	4,230	1,620	5,450	2,070	6,920
24 Darnestown	992	3,090	1,240	3,730	1,570	4,710

TABLE A-3

Alternative #2	1975		1980		1985	
	D.U.'s	Pop.	D.U.'s	Pop.	D.U.'s	Pop.
<u>Trend, Down-County Weight</u>						
TOTAL---	193,770	589,600	225,770	644,600	263,680	740,000
1. INNER SUBURBS	95,857	268,650	101,820	275,100	115,830	313,600
PA 31 Wheaton	25,923	82,970	27,520	85,060	29,760	92,980
32 Kemp Mill	11,213	35,170	11,810	35,820	13,660	41,880
35 Bethesda	32,876	90,460	34,640	92,010	37,450	100,550
36 Silver Spring	15,405	33,740	17,330	36,640	24,320	52,000
37 Takoma Park	10,440	26,310	10,520	25,570	10,640	26,170
2. OUTER SUBURBS	70,301	234,010	85,370	256,450	104,200	306,400
PA 23 Olney	5,377	18,280	6,380	19,620	7,430	22,540
25 Travilah	2,042	7,210	2,330	7,430	3,790	11,950
26 Rockville	14,972	48,850	17,880	52,750	21,000	61,070
27 Aspen Hill	13,388	46,800	15,680	49,510	17,950	55,910
28 Cloverly	2,709	9,450	3,480	10,990	3,810	11,860
29 Potomac	8,974	35,170	10,660	37,800	11,820	41,350
30 N. Bethesda	11,050	31,350	13,850	35,590	21,240	53,830
33 White Oak	9,099	28,500	10,430	29,550	11,320	31,630
34 Fairland	2,690	8,400	4,680	13,210	5,840	16,260
3. I-270 CORRIDOR	19,552	59,660	28,570	80,250	31,230	86,400
PA 13 Clarksburg	578	2,090	730	2,360	1,000	3,280
19 Germantown	1,520	5,510	5,510	17,970	7,190	22,820
20&21 Gaithersburg	17,454	52,060	22,330	59,920	23,040	60,300
4. RURAL AREA	8,060	27,280	10,010	32,800	12,420	33,600
PA 10 Bennett	841	2,730	1,010	3,180	1,180	3,070
11 Damascus	1,187	3,810	1,390	4,350	1,980	5,190
12 Dickerson	342	1,220	390	1,350	420	1,200
14 Goshen	1,115	4,150	1,420	5,140	1,720	5,110
15 Patuxent	929	3,520	980	3,610	1,200	3,640
16 Martinsburg	55	200	80	280	110	300
17 Poolesville	892	2,600	1,240	3,510	1,670	3,900
18 Lower Seneca	485	1,730	540	1,850	600	1,790
22 Rock Creek	1,222	4,230	1,720	5,790	1,970	5,480
24 Darnestown	992	3,090	1,240	3,740	1,570	3,920

TABLE A-4

Alternative #3 Trend, Up-County Weight	1975		1980		1985	
	D.U.'s	Pop.	D.U.'s	Pop.	D.U.'s	Pop.
TOTAL---	193,770	589,600	225,790	644,600	263,800	740,000
1. INNER SUBURBS	95,857	268,650	97,310	261,700	106,860	285,500
PA 31 Wheaton	25,923	82,970	25,990	79,810	26,690	82,120
32 Kemp Mill	11,213	35,170	11,360	34,240	12,760	38,540
35 Bethesda	32,876	90,460	34,070	89,930	36,310	96,000
36 Silver Spring	15,405	33,740	15,420	32,400	20,500	43,160
37 Takoma Park	10,440	26,310	10,470	25,320	10,600	25,670
2. OUTER SUBURBS	70,301	234,010	77,680	231,100	88,860	254,700
PA 23 Olney	5,377	18,280	6,380	19,350	7,430	21,840
25 Trarilah	2,042	7,210	2,330	7,340	3,790	11,580
26 Rockville	14,972	48,850	15,860	46,140	16,950	47,780
27 Aspen Hill	13,388	46,800	14,750	45,940	16,090	48,580
28 Cloverly	2,709	9,450	3,480	10,850	3,810	11,500
29 Potomac	8,974	35,170	9,960	34,856	10,430	35,350
30 N. Bethesda	11,050	31,350	11,310	28,670	16,210	39,810
33 White Oak	9,099	28,500	9,780	27,320	10,010	27,110
34 Fairland	2,690	8,400	3,830	10,654	4,140	11,170
3. I-270 CORRIDOR	19,552	59,660	40,690	118,500	55,470	158,000
PA 13 Clarksburg	578	2,090	1,100	3,650	1,750	5,600
19 Germantown	1,520	5,510	10,840	36,080	17,850	57,440
20&21 Gaithersburg	17,454	52,060	28,750	78,770	35,870	94,960
4. RURAL AREA	8,060	27,280	10,110	33,300	12,610	41,800
PA 10 Bennett	841	2,730	1,010	3,200	1,180	3,760
11 Damascus	1,187	3,810	1,390	4,350	1,980	6,350
12 Dickerson	342	1,220	390	1,360	420	1,470
14 Goshen	1,115	4,150	1,420	5,170	1,720	6,270
15 Patuxent	929	3,520	980	3,620	1,200	4,460
16 Martinsburg	55	200	80	280	110	370
17 Poolesville	892	2,600	1,240	3,530	1,670	4,780
18 Lower Seneca	485	1,730	540	1,860	590	2,160
22 Rock Creek	1,222	4,230	1,820	6,160	2,170	7,380
24 Darnestown	992	3,090	1,240	3,750	1,570	4,800

TABLE A-5

Alternative #4 Low Growth	1975		1980		1985	
	D.U.'s	Pop.	D.U.'s	Pop.	D.U.'s	Pop.
TOTAL---	193,770	589,600	210,310	604,000	226,770	640,000
1. INNER SUBURBS	95,857	268,650	96,170	258,300	99,080	264,000
PA 31 Wheaton	25,923	82,970	26,020	79,780	26,370	80,290
32 Kemp Mill	11,213	35,170	11,290	33,960	12,090	36,100
35 Bethesda	32,876	90,460	33,000	86,950	33,800	88,430
36 Silver Spring	15,405	33,740	15,410	32,340	16,310	33,980
37 Takoma Park	10,440	26,310	10,450	25,270	10,510	25,200
2. OUTER SUBURBS	70,301	234,010	74,070	221,400	79,430	226,900
PA 23 Olney	5,377	18,280	5,680	17,320	6,480	18,850
25 Travilah	2,042	7,210	2,090	6,630	2,590	7,830
26 Rockville	14,972	48,850	15,370	44,990	15,870	44,400
27 Aspen Hill	13,388	46,800	15,050	47,190	15,350	45,850
28 Cloverly	2,709	9,450	3,050	9,460	3,450	10,410
29 Potomac	8,974	35,170	9,210	32,430	9,910	33,360
30 N. Bethesda	11,050	31,350	11,100	28,290	11,700	28,540
33 White Oak	9,099	28,500	9,250	25,980	10,010	26,810
34 Fairland	2,690	8,400	3,270	9,140	4,070	10,850
3. I-270 CORRIDOR	19,552	59,660	30,550	94,200	36,840	111,300
PA 13 Clarksburg	578	2,090	730	2,580	1,030	74,990
19 Germantown	1,520	5,510	6,580	23,460	9,440	32,730
20&21 Gaithersburg	17,454	52,060	23,210	68,160	26,370	3,680
4. RURAL AREA	8,060	27,280	9,520	30,100	11,430	37,800
PA 10 Bennett	841	2,730	880	2,660	1,030	3,280
11 Damascus	1,187	3,810	1,450	4,390	1,850	5,940
12 Dickerson	342	1,220	380	1,280	390	1,370
14 Goshen	1,115	4,150	1,220	4,260	1,520	5,560
15 Patuxent	929	3,520	1,030	3,670	1,130	4,210
16 Martinsburg	55	200	100	320	110	370
17 Poolesville	892	2,600	1,320	3,610	1,720	4,910
18 Lower Seneca	485	1,730	530	1,750	570	1,970
22 Rock Creek	1,222	4,230	1,520	4,960	1,620	5,630
24 Darnestown	992	3,090	1,090	3,200	1,490	4,560

TABLE A-6

Alternative #5 High Growth	1975		1980		1985	
	D.U.'s	Pop.	D.U.'s	Pop.	D.U.'s	Pop.
TOTAL---	193,770	589,600	233,770	665,000	283,780	800,000
1. INNER SUBURBS	95,857	268,650	103,720	276,300	111,360	295,000
PA 31 Wheaton	25,923	82,970	27,220	82,960	28,220	86,200
32 Kemp Mill	11,213	35,170	13,110	39,390	13,210	39,600
35 Bethesda	32,876	90,460	34,640	90,710	36,880	96,800
36 Silver Spring	15,405	33,740	18,230	38,010	22,410	46,800
37 Takoma Park	10,440	26,310	10,520	25,230	10,640	25,600
2. OUTER SUBURBS	70,301	234,010	82,630	245,400	94,430	270,000
PA 23 Olney	5,377	18,280	6,380	19,350	7,380	21,580
25 Travilah	2,042	7,210	2,330	7,230	3,790	11,520
26 Rockville	14,972	48,850	16,580	48,240	18,970	53,520
27 Aspen Hill	13,388	46,800	15,680	48,830	17,020	51,330
28 Cloverly	2,709	9,450	3,480	10,840	3,800	11,420
29 Potomac	8,974	35,170	10,660	37,300	11,120	37,520
30 N. Bethesda	11,050	31,350	12,550	31,830	16,690	40,880
33 White Oak	9,099	28,500	10,430	29,140	10,670	28,730
34 Fairland	2,690	8,400	4,540	12,640	4,990	13,500
3. I-270 CORRIDOR	19,552	59,660	37,320	110,000	67,220	193,000
PA 13 Clarksburg	578	2,090	1,100	3,700	1,380	4,430
19 Germantown	1,520	5,510	9,350	31,570	23,740	76,710
20&21 Gaithersburg	17,454	52,060	26,870	74,730	42,100	111,860
4. RURAL AREA	8,060	27,280	10,100	33,300	12,770	42,000
PA 10 Bennett	841	2,730	1,010	3,210	1,180	3,740
11 Damascus	1,187	3,810	1,380	4,290	1,970	6,220
12 Dickerson	342	1,220	390	1,370	420	1,460
14 Goshen	1,115	4,150	1,420	5,200	1,720	6,230
15 Patuxent	929	3,520	980	3,640	1,200	4,430
16 Martinsburg	55	200	80	280	110	370
17 Poolesville	892	2,600	1,240	3,550	1,590	4,530
18 Lower Seneca	485	1,730	540	1,860	590	2,030
22 Rock Creek	1,222	4,230	1,820	6,130	2,420	8,210
24 Darnestown	992	3,090	1,240	3,770	1,570	4,780

TABLE A-7

EMPLOYMENT ALLOCATION

Alternative #1

Trend (Existing Zoning & Market)

		Existing	Change		
		1975	75-80	80-85	75-85
1.	Inner Suburbs	124,439	18,473	25,690	44,163
PA 35	Bethesda	64,832	9,772	9,052	18,824
31	Wheaton	20,971	1,813	7,475	9,288
36	Silver Spring	30,083	6,285	8,368	14,653
32	Kemp Mill	3,839	403	228	631
37	Takoma Park	4,714	200	567	767
2.	Outer Suburbs	80,424	16,459	17,833	34,292
PA 25	Travilah	1,118	0	128	128
29	Potomac	7,800	179	1,210	1,389
26	Rockville	20,558	7,901	3,601	11,502
30	N. Bethesda	28,771	6,127	7,413	13,540
27	Aspen Hill	7,339	549	686	1,235
23	Olney	2,493	545	378	923
28	Cloverly	1,021	323	494	817
33	White Oak	8,408	647	3,299	3,946
34	Fairland	2,916	188	624	812
3.	I-270 Corridor	33,120	7,946	8,714	16,660
PA 13	Clarksburg	631	58	195	253
19	Germantown	4,058	903	1,460	2,363
20 & 21	Gaithersburg	28,431	6,985	7,059	14,044
4.	Rural Area	5,017	2,122	2,763	4,885
PA 24	Darnestown	127	21	27	48
18	Lower Seneca	163	231	162	393
17	Poolesville	393	240	102	342
16	Martinsburg	70	75	0	75
12	Dickerson	349	105	73	178
10	Bennett	70	0	0	0
11	Damascus	862	25	399	424
14	Goshen	280	50	375	425
15	Patuxent	536	0	175	175
22	Rock Creek	2,167	1,375	1,450	2,825

TABLE A-8

EMPLOYMENT ALLOCATION

Alternative #2

Trend (Down-County Weight)

		Existing	Change		
		1975	75-80	80-85	75-85
1.	Inner Suburbs	124,439	19,407	27,485	46,892
PA 35	Bethesda	64,832	10,548	9,823	20,371
31	Wheaton	20,971	4,294	6,872	11,166
36	Silver Spring	30,083	3,925	9,556	13,481
32	Kemp Mill	3,839	440	373	813
37	Takoma Park	4,714	200	861	1,061
2.	Outer Suburbs	80,424	15,630	17,165	32,795
PA 25	Travilah	1,118	95	32	127
29	Potomac	7,800	1,356	737	2,093
26	Rockville	20,558	4,281	3,188	7,469
30	N. Bethesda	28,771	6,911	6,775	13,686
27	Aspen Hill	7,339	168	656	824
23	Olney	2,493	272	353	625
28	Cloverly	1,021	275	823	1,098
33	White Oak	8,408	2,130	4,296	6,426
34	Fairland	2,916	142	305	447
3.	I-270 Corridor	33,120	8,389	8,788	17,177
PA 13	Clarksburg	631	651	2,415	3,066
19	Germantown	4,058	1,468	2,055	3,523
20 & 21	Gaithersburg	28,431	6,270	4,318	10,588
4.	Rural Area	5,017	1,574	1,562	3,136
PA 24	Darnestown	127	22	35	57
18	Lower Seneca	163	25	233	258
17	Poolesville	393	99	85	184
16	Martinsburg	70	0	0	0
12	Dickerson	349	39	222	261
10	Bennett	70	0	0	0
11	Damascus	862	24	22	46
14	Goshen	280	50	50	100
15	Patuxent	536	124	113	237
22	Rock Creek	2,167	1,191	802	1,993

TABLE A-9

EMPLOYMENT ALLOCATION

Alternative #3

Trend (Up-County Weight)

		Existing	Change		
		1975	75-80	80-85	75-85
1.	Inner Suburbs	124,439	18,671	11,818	30,489
PA 35	Bethesda	64,832	8,720	4,583	13,303
31	Wheaton	20,971	2,850	3,022	5,872
36	Silver Spring	30,083	6,103	3,872	9,975
32	Kemp Mill	3,839	373	97	470
37	Takoma Park	4,714	625	244	869
2.	Outer Suburbs	80,424	14,254	13,791	28,041
PA 25	Travilah	1,118	101	15	116
29	Potomac	7,800	726	811	1,537
26	Rockville	20,558	5,503	3,035	8,538
30	N. Bethesda	28,771	4,787	5,252	10,039
27	Aspen Hill	7,339	251	868	1,119
23	Olney	2,493	349	346	695
28	Cloverly	1,021	548	183	731
33	White Oak	8,408	1,665	2,631	4,296
34	Fairland	2,916	324	650	970
3.	I-270 Corridor	33,120	10,376	24,550	34,930
PA 13	Clarksburg	631	0	683	683
19	Germantown	4,058	1,570	6,433	8,003
20 & 21	Gaithersburg	28,431	8,806	17,434	26,244
4.	Rural Area	5,017	1,699	4,841	6,540
PA 24	Darnestown	127	0	47	47
18	Lower Seneca	163	0	432	432
17	Poolesville	393	80	356	436
16	Martinsburg	70	10	0	10
12	Dickerson	349	50	50	100
10	Bennett	70	0	521	521
11	Damascus	862	0	0	0
14	Goshen	280	350	0	350
15	Patuxent	536	116	334	450
22	Rock Creek	2,167	1,093	3,101	4,194

TABLE A-10

EMPLOYMENT ALLOCATION

Alternative #4

Low Growth

		Existing	Change		
		1975	75-80	80-85	75-85
1.	Inner Suburbs	124,439	9,449	4,756	14,205
PA 35	Bethesda	64,832	4,154	1,706	5,860
31	Wheaton	20,971	1,961	589	2,550
36	Silver Spring	30,083	2,365	1,726	4,091
32	Kemp Mill	3,839	259	81	340
37	Takoma Park	4,714	710	654	1,364
2.	Outer Suburbs	80,424	8,343	4,463	12,806
PA 25	Travilah	1,118	80	48	128
29	Potomac	7,800	627	150	777
26	Rockville	20,558	2,123	653	2,776
30	N. Bethesda	28,771	3,038	1,512	4,550
27	Aspen Hill	7,339	250	339	589
23	Olney	2,493	189	378	567
28	Cloverly	1,021	645	443	1,088
33	White Oak	8,408	1,106	817	1,923
34	Fairland	2,916	285	123	408
3.	I-270 Corridor	33,120	1,654	574	2,228
PA 13	Clarksburg	631	248	161	409
19	Germantown	4,058	286	128	414
20 & 21	Gaithersburg	28,431	1,120	285	1,405
4.	Rural Area	5,017	554	207	761
PA 24	Darnestown	127	41	0	41
18	Lower Seneca	163	11	10	21
17	Poolesville	393	0	22	22
16	Martinsburg	70	0	0	0
12	Dickerson	349	0	0	0
10	Bennett	70	0	0	0
11	Damascus	862	0	0	0
14	Goshen	280	0	0	0
15	Patuxent	536	62	113	175
22	Rock Creek	2,167	440	62	502

TABLE A-11

EMPLOYMENT ALLOCATION

Alternative #5

High Growth

		Existing	Change		
		1975	75-80	80-85	75-85
1.	Inner Suburbs	124,439	25,421	19,130	44,551
PA 35	Bethesda	64,832	11,051	8,153	19,204
31	Wheaton	20,971	4,162	4,858	9,020
36	Silver Spring	30,083	9,024	5,351	14,375
32	Kemp Mill	3,839	199	634	833
37	Takoma Park	4,714	985	134	1,119
2.	Outer Suburbs	80,424	15,862	21,380	37,242
PA 25	Travilah	1,118	11	109	120
29	Potomac	7,800	500	1,641	2,141
26	Rockville	20,558	5,874	4,255	10,129
30	N. Bethesda	28,771	4,701	10,641	15,342
27	Aspen Hill	7,339	350	365	715
23	Olney	2,493	165	394	559
28	Cloverly	1,021	452	513	965
33	White Oak	8,408	3,455	3,364	6,819
34	Fairland	2,916	354	98	452
3.	I-270 Corridor	33,120	14,078	25,070	39,148
PA 13	Clarksburg	631	0	5,698	5,698
19	Germantown	4,058	4,571	4,422	8,993
20 & 21	Gaithersburg	28,431	9,507	14,950	24,457
4.	Rural Area	5,017	3,139	5,920	9,059
PA 24	Darnestown	127	41	08	49
18	Lower Seneca	163	11	223	234
17	Poolesville	393	10	56	66
16	Martinsburg	70	0	0	0
12	Dickerson	349	0	125	125
10	Bennett	70	0	0	0
11	Damascus	862	0	2,449	2,449
14	Goshen	280	0	33	33
15	Patuxent	536	62	201	263
22	Rock Creek	2,167	3,015	2,825	5,840

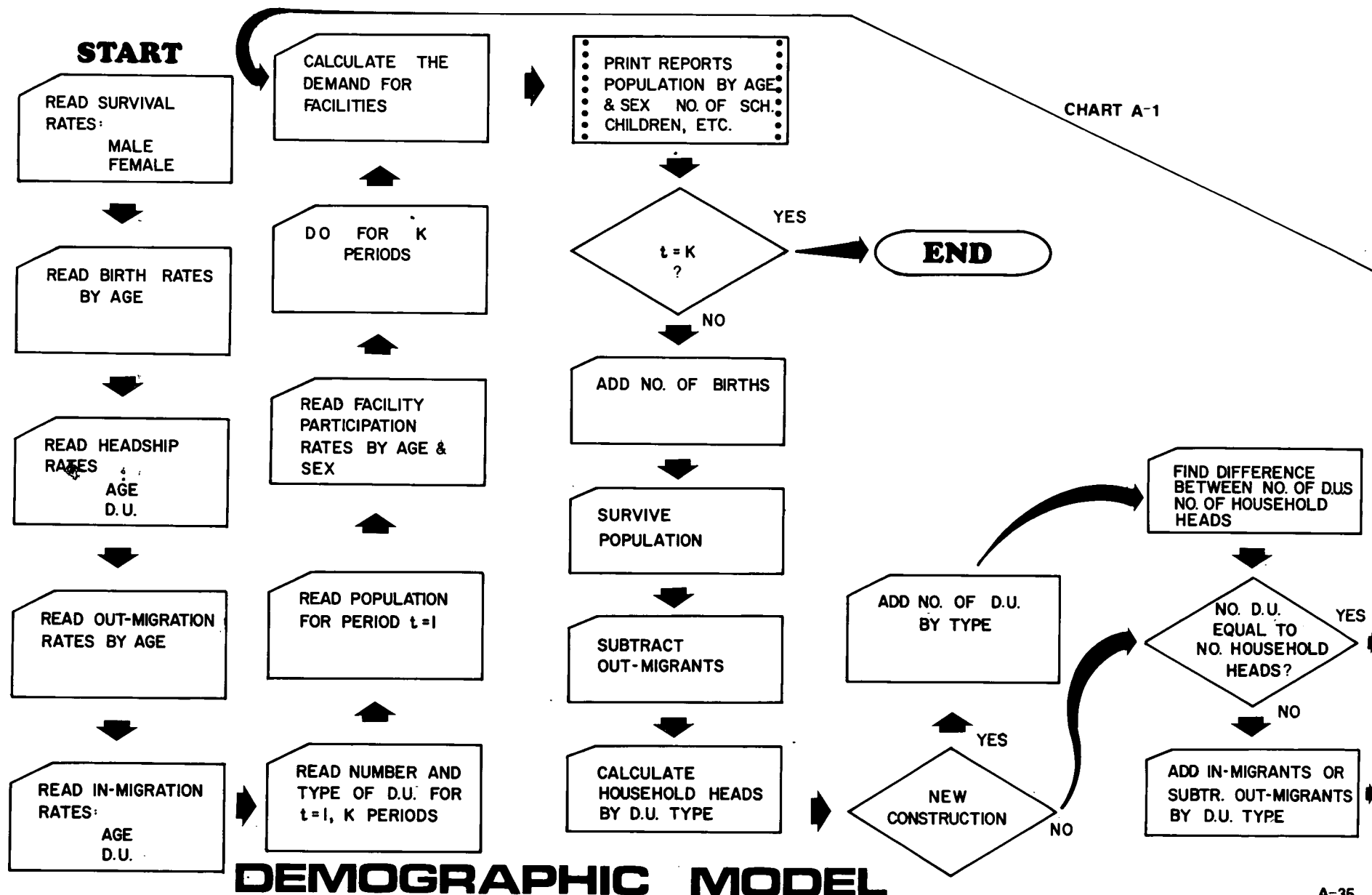


CHART A-1

II. REVENUE ASSUMPTIONS

A. Overall Fiscal Assumption

1. Constant Dollars

These "budgets" show what the tax rate would be for the next 10 years, given the various planning assumptions in 1975 constant dollars. Revenues and costs were not adjusted to reflect inflation. If a study were done using dollars which include inflation it could result in different conclusions than those reached here, depending to what extent each cost or revenue is inflated. The use of inflation factors would be more appropriate for a program/budgeting study for which the scope is shorter term.

The Department of Labor's consumer price index is often mistaken for THE inflation rate. In fact, this index is a composite of the inflation rates of about four hundred consumer items selected to represent the movement of prices of all goods and services purchased by wage earners. All goods and services purchased by the County have individual inflation rates which vary from the consumer price index.

The causes of inflation are often based in world economics. World consumption and supply as well as the policies of governments, including our own Federal government, all affect the inflation rate of any particular item the County may buy. To inflate everything by the trend of the consumer price index would add nothing to the analysis .

since all costs and revenues would rise proportionately in each alternative. To calculate individual inflation rates for all items with proper consideration of all possible variables would require an inordinate amount of staff time to yield questionable results.

Appreciation is distinguishable from inflation. An appreciation rate represents a real increase in the value of the particular item in relationship to the value of all other items.

Inflation occurs when the supply of cash increases faster than the supply of goods. Appreciation occurs because the demand for a particular good increases with no increase in supply, irregardless of the supply of cash. The Washington area is growing in terms of population. It is therefore foreseeable that land will appreciate since the supply of land is relatively fixed. The value of land was therefore appreciated as discussed below under assessable base.

2. Bonding Rate and Term

The bonding interest rate and term used for all growth alternatives was 5% interest rate and a twenty year term. This is identical to the rates used in the County CIP document.

Like inflation, the bonding rate fluctuates daily depending upon innumerable factors. It was not within the scope of this study to make an independent prediction of municipal bond interest rates. The critical factor is that the rates are the same for all runs. This makes the interest payment differences between runs dependent upon

the differences in capital outlay. The model is set up so that the impact of a change in the bonding rate can be determined in later studies.

B. Assessable Base

1. Existing Assessable Base

- a. The existing assessable base was taken directly from the automated parcel file which is used by the County tax assessor. The portion of the assessable base which represents land values is appreciated over time at the rate of 3% per year. On a county-wide basis this has been the historical average appreciation of land. The assessed value of fixed commercial personal property was obtained from the PSP.
- b. It was assumed for all types of new development that the present cost in 1975 dollars would be constant over time. This implies that these hypothesized structures would either have the same amenity and construction quality mix or a different mix with the same current cost as those units constructed in the past year. It was also assumed that the existing assessable base would be maintained and would not depreciate over the next ten years.

2. New Single-family Home Assessment

For the purpose of this study, single-family homes include detached units and townhouses. A weighted average cost of such units by fiscal area was taken from the Research Division Quarterly Report (data

was from the last quarter of 1974 accumulated from the parcel file). Land value was subtracted out from the selling price to avoid double counting it. (Land value is already included in the existing assessable base.) These values were then multiplied by the number of such housing units to be constructed in each fiscal area over the ten-year period for each alternative.

3. New Multi-family Unit Assessments

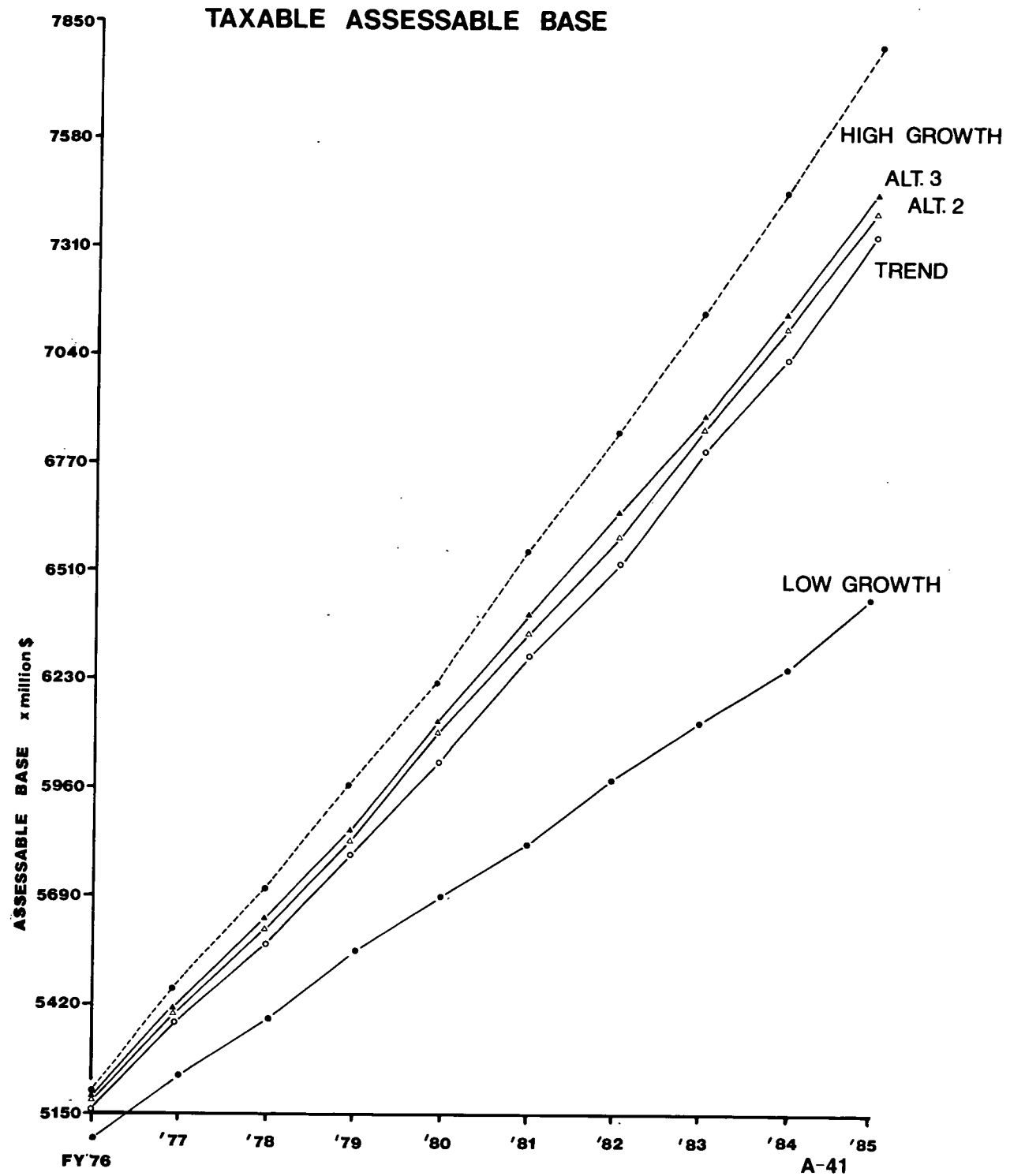
Because of the great difference in the assessment of multi-family condominiums as opposed to multi-family rental units, an assumption had to be made as to what percentage of multi-family units would be condominiums. After researching this problem, Marcou, O'Leary and Associates, Inc. suggested that it would be reasonable to assume that for the next five years, 70% of all multi-family units built will be condominiums. After 1980 the percentage would likely drop to 50 percent. These percentage breakdowns were used.

The values of the multi-family units in each fiscal area were obtained from a report issued by the County Office of Housing, "Update of Selected Information on New Offerings," dated March 28, 1975. Once again the fraction of the unit value attributable to land value was subtracted out to avoid double counting. The value of the units in each fiscal area, weighted by the condominium/rental ratio, was multiplied by the number of multi-family units in each area to obtain the addition to the assessable base. The numbers of multi-family units in each area vary with each alternative.

4. New Commercial Assessment

Using the employment projections made in the 1974-1984 Population, Household and Employment Growth Forecast published by the Planning Board, the projected commercial employment was allocated within areas by Standard Industrial Codes (SIC) through a "shift-share" technique. This process internally assumed that the factors which attracted certain commercial uses to particular areas would continue to operate. From SIC breakdowns, estimates of the number of employees needing office, retail and wholesale land uses were made in conformity with the methodology used in the Rockville Transit Corridor Market Analysis, 1975. Government employees in Government-owned buildings, and institutions which are not taxable, were excluded. The future ratio of Government employees in Government versus private space was estimated by the General Services Administration to be 50-50; the County for its employees estimated 60-40.

The County parcel file, which includes assessed value and square footage of improvements, was matched on a selected sample basis to the Metropolitan Washington Council of Governments at-place employment file. In this manner, figures for square footage needs and improved value per employee by land use type were calculated. A weighted average of commercial space needs and improved value, including taxable personal property, for each land use type for each fiscal area was multiplied by the number of commercial employees in each fiscal area.



Implicit in each factor is the unique office, retail and wholesale mix characteristic of each fiscal area. These "shift-share" allocations were adjusted in the up-county growth alternative 3, and high growth alternative 5, to reproduce the shift of retail use to areas accessible to the new population. Other than that factor, the difference in the absolute number of commercial employees and the number of commercial employees projected in each fiscal area for each growth alternative, account for the differences in assessable base attributable to commercial growth for each alternative.

5. New Industrial Assessment

In essence, the same methodology used to compute new commercial assessments was used to compute new industrial assessments. A sample from the parcel file was matched to its counterpart in the Metropolitan Washington COG at-place employment file to get an estimate of dollars of improved value per employee, including taxable personal property. This area specific number was then multiplied by the number of industrial employees in each area which varied with each alternative.

C. Income Tax Subsystem

1. Introduction

The County income tax is a State-collected, local surtax on the State income tax. The County rate is 50% of the State's. The combined State and local tax rates are 3% on the

first \$1,000 of income, 4.5% on the second, 6% on the third \$1,000, and 7.5% on all taxable income over \$3,000.

2. Existing Income

The income of County residents, as estimated in the PSP for Fiscal Year 1976, was distributed to fiscal areas on the basis of household income information obtained from the 1974 Census Update Survey. In conformity with the Bethesda Fiscal Impact Study (past trends), it was assumed that the County's existing income would increase in real dollars by a factor of 3% per year. In economic terms this is due to increases in productivity; in layman's terms it is due to annual increases in salaries and promotions. It represents an increase in the real buying power of County residents, not inflationary increases.

The County's revenue from the income tax was obtained by means of a regression equation using household income as the independent variable.⁽¹⁾

3. Income Tax Revenue from New Households

There is a high correlation between the purchase price of a dwelling unit or the rent of the dwelling unit and household income of the occupants. The weighted selling price of recently built

⁽¹⁾ County Revenue = $-\$66.8271 + .0206$ (Household Income)
 $R^2 = .9932$

Source: Bethesda Cost/Benefit Study

single-family and townhouse units was obtained by fiscal area from the 1975 Quarterly Report and a regression equation was used to determine the household income of the occupants.⁽²⁾ The figures for the selling price of new multi-family condominiums were taken from the County's Office of Housing information collected in March, 1975. The same regression was used.

A weighted average of the rent of new rental units for each fiscal area was calculated from survey results published by the County Office of Housing in February. Another regression equation was used to estimate the gross income earned by the occupants of these dwelling units.⁽³⁾

The gross income of these new residents was related to the County share of income tax revenue by means of the equation previously stated. The revenue differs between alternatives as the number of dwelling units and the mix between multi-family and other types of units change within the fiscal areas.

(2) $\text{Household Income} = \$4,964 + .413 (\text{Purchase Price of Dwelling Unit})$

$$R^2 = .9970$$

Source: Bethesda Cost/Benefit Study

(3) $\text{Gross Income} = -\$516.61 + 64.7355 (\text{Monthly Rent})$

$$R^2 = .9992$$

Source: Bethesda Cost/Benefit Study

D. "TAXES F1 TO F4" Subsystem

This subsystem includes the Energy Tax, the Telephone Tax and the County Transfer Tax.

1. Energy Tax

Although the tax rate is held constant for all years in all alternatives, the revenue generated by the energy tax varies with energy consumption. For the purpose of this analysis, electric consumption was used as the indicator to determine future increases in revenue from the energy tax. (The current tax rate is .13005 cents per 1000 kilowatts.)

P.E.P.Co. has determined current rates of use for single-family units, multi-family dwelling units, commercial development and industrial development. These rates of use were multiplied by the amount of new development over the ten-year study period to get increases to existing consumption. Finally, kilowatt consumption was divided by the current tax rate to calculate expected revenues.

P.E.P.Co. anticipates a 5% increase per year for all types of development. However, for the purpose of calculating revenues, across the board increase in electric consumption was assumed to be 1.5%.

2. Telephone Tax

The County taxes local telephone charges at a rate of 3.6%. It was assumed that every new dwelling unit would have telephone service

comparable to current units. A similar assumption was made for commercial and industrial users. Revenue will differ between alternatives based on the differences in residential, commercial and industrial growth.

3. Transfer Tax

There is a 1% tax on transfers of real property sold for over \$35,000, and .25% on real property between \$35,000 and \$25,000. A high correlation was found between the assessable tax base and the revenue generated by the transfer tax. The total value of transferred real property differs within the two different tax brackets which, in turn, differs between fiscal areas. The use of assessable base in essence means that the revenue generated by the transfer tax differs between alternatives as a function of new residential, commercial and industrial development.

E. "L&P R S" Subsystem

Included in this section are revenues generated from Licenses, Permits, State revenue sharing and Federal revenue sharing.

1. Licenses and Permits

There are 17 separate line items which make up this element in the Public Services Program. Total revenues in Fiscal Year 1976 are estimated to be \$1,920,000. Permits for bicycles, marriage, penalties or licenses, sediment control wells, septic tanks and businesses were calculated for future years for each alternative on

a per capita basis. Building, electrical, explosive and occupancy permits in the future were calculated per new dwelling unit for each alternative.

2. State Revenue Sharing

- a. State shared revenue comes from taxes on admissions, alcoholic beverages, cigarettes, franchises, gasoline, motor vehicles, and race tracks. Future State shared revenue in the above classification was determined on a per capita basis.
- b. The State has a tax on real property at the rate of 21¢ per hundred dollars of assessed value. Out of this fund the County receives one-half. The County's future share was based on the assessable base associated with each alternative and the current tax rate.
- c. The State recordation tax, identical in nature to the County's own transfer tax, is \$4.40 per \$1000 of assessed value recorded. As such, future increases in revenue from the recordation tax were estimated from the growth in the assessable base.

3. Federal Revenue Sharing

The formula to determine the County's income from Federal revenue sharing is complex and subject to change. The present central factor in the computation is population. This study assumes population will remain the most heavily weighted factor.

In Fiscal Year 1976 the County will receive \$7,000,000, which is a per capita rate of \$11.89. This per capita rate was used for all years for all alternatives.

F. "MISTX RV." Subsystem

The hotel tax and miscellaneous revenue are the source of the funds reported by this subsystem.

1. Hotel Tax

Receipts from hotel/motel room charges are taxed at 5% of the gross. Estimated revenue from this tax in Fiscal Year 1976 is \$450,000.

To estimate future revenues, a market study made by Economic Research Associates for the Bethesda Transit Center station was used.⁽⁴⁾ This study made forecasts of county-wide hotel room demand. An estimate of future tax revenue was made by multiplying the room demand times the average charge (\$21) times the tax rate.

Revenues for the first three alternatives were identical. A varying room demand was used for the low and high growth alternatives.

2. Miscellaneous Revenue

Within this revenue category is interest on investments, library rentals, property rentals,

⁽⁴⁾ Analysis of Market Support for the Bethesda Transit Center, November, 1973.

WSTC charges, group insurance fund contributions from private sources, sundry revenue, Metro district fund, street assessments, and other revenues.

Interest on investments was projected as a function of assessable base. All other revenues were calculated on the basis of population.

In addition to the items in the PSP mentioned above, the "MISTX" subsystem includes all revenues not included within the functional subsystems but needed to bring expenditures in line with revenues for FY 1976. These funds are composed of various revenues which could not be handled adequately within the subsystems due to the necessary use of the Proposed PSP or the major resource document and to the technical limits of the model.

III. PUBLIC SERVICE COST ASSUMPTIONS BY SUBSYSTEM

PUBLIC SCHOOLS

A. Introduction

An analysis of the public school system required a number of assumptions at a time when the School Board and the citizens of Montgomery County are considering several options in methods of providing education for the youth of the County. The assumptions contained here represent in essence a continuation of the present standards and methods of education in the County with the exception perhaps in the assumptions on closing schools. In this subsystem analysis data on number of school age children was projected on a fiscal area basis to be consistent with the structure of the rest of the fiscal analysis. There was no attempt made to project enrollment at individual schools due to the lack of relatively simple and reliable data and projection methods for such small areas and, also, due to the changing boundaries of individual schools. For these reasons when closing a school appeared necessary, given the criteria used, no specific school was singled out to be closed.

The set of tables at the end of this subsystem show the number of students, present and future percent capacity of the schools by fiscal area and for elementary, junior high and senior high schools, and the actions taken (closing or constructing schools) for each of the five alternatives.

B. Assumptions

1. The community based school system will be continued: While school boundaries can shift slightly, there will not be major busing between fiscal areas. The operational assumption is that enough capacity in each of the four fiscal analysis areas must be provided for all of the pupils in that area. This allows for some options such as clustering or pairing of schools.
2. If schools fall well below capacity enrollment, they will be closed: The Report of the Small Schools Task Force, November, 1973, recommended that if an elementary school drops below 300 pupils that it be considered for closing based on six criteria including availability of space in other schools, long range need for the school, transportation implications and other factors. Operationally this assumption means for this analysis that when enrollment by fiscal area declines by the average size in 1975 of all the schools in the area, a school will be closed unless enrollment is projected to pick up in the future. An example in alternative #1 for the inner suburbs would be as follows:

1975 enrollment = 71.9% capacity
1975 average school size = 355 pupils
for each drop of 355 students - close 1 school

The same methodology was used for junior and senior high schools. The major cost saving is in counting only one-third of the modernization costs of schools which will be closed.

3. Schools will be built in modules as needed: Complete schools will be built using the present size and costs for schools presently planned. There will not be a

major shift towards building temporary or movable classrooms any more than at present as additions to existing schools. The proposed Area 6 new schools were used as size and cost prototypes for the new schools. Their capacities are as follows:

Elementary	700 students
Junior High	1,100 students
Senior High	1,200 students

4. The present policy of adding physical education facilities and modernizing schools will be continued: The present plans for modernization and construction of physical education facilities will be used as cited in the adopted FY 1976 Capital Improvements Program, modified by the decisions to close schools. In other words if it is determined that 3 schools must be closed during a five-year period, two-thirds of the cost of 3 school modernizations will be dropped from the Capital Improvements Program.

C. Methodology

1. Operating Costs

As noted above, the projections of school enrollment were made by fiscal area for each of the five alternative growth rates using the demographic model discussed elsewhere in this report. Total operating costs were calculated on a per pupil basis. The PSP showed operating costs per pupil increasing at an annual compound rate of 6.1% per year. The FY 1976 operating cost per pupil was, therefore, increased at this rate.

2. Capital Expenditures

To determine capital expenditures the CIP was used as a base; however, schools were added using the assumptions stated above or modernization costs decreased according to the above assumptions. State aid for school construction was included under capital grants and also under revenues in the budget. Future capital expenditures beyond the six-year period were calculated not only on the basis of the costs of new schools but also to keep the annual average per pupil costs over the period FY 76-81 constant to FY 85.

3. Revenues

Funds from other jurisdictions, particularly the State, for capital expenditures, were included as revenues. The per student revenues for operating costs remained constant over the period FY 76-81 in the PSP and were therefore kept constant over the period of this study.

PRESENT ENROLLMENT AND CAPACITY

	<u>Present Capacity</u>	<u>Present Enrollment</u>	<u>Present % Capacity</u>
F-1 Inner Suburbs			
Elementary	29,135	20,956	71.9
Junior High	14,830	11,975	80.7
Senior High	13,650	<u>12,224</u>	89.6
F-1 Total		45,155	
F-2 Outer Suburbs			
Elementary	39,430	30,268	76.8
Junior High	14,805	12,325	83.2
Senior High	16,960	<u>14,652</u>	86.4
F-2 Total		57,245	
F-3 I-270 Corridor			
Elementary	10,370*	7,558	72.9
Junior High	4,260+	2,846	66.8
Senior High	4,700	<u>4,384</u>	93.3
F-3 Total		14,788	
F-4 Rural			
Elementary	3,780	3,441	91.0
Junior & Senior High	2,480	<u>2,159</u>	87.1
F-4 Total		5,600	
GRAND TOTAL		<u><u>122,788</u></u>	

* Present capacity includes Independence School which is under construction.

+ Present capacity includes Ridgeview School which is under construction.

ALTERNATIVE 1

PUBLIC SCHOOL ANALYSIS

	1980		1980		1985		1985
	<u>Enrollment</u>	<u>Action</u>	<u>% Capacity</u>	<u>Enrollment</u>	<u>Action</u>	<u>Capacity</u>	
F-1 Inner Suburbs							
Elementary	17,136	-10 schools	70.8	19,601	-	80.9	
Junior High	9,375	- 1 school	68.1	9,782	-	71.1	
Senior High	<u>10,218</u>	-	74.9	<u>9,391</u>	-1 school	80.3	
F-1 Total	36,729			38,774			
F-2 Outer Suburbs							
Elementary	28,218	- 2 schools	73.9	29,833	-	78.1	
Junior High	9,967	- 1 school	72.5	10,206	-	74.2	
Senior High	<u>39,917</u>	- 1 school	91.2	<u>12,617</u>	-	82.7	
F-2 Total	52,102			52,656			
F-3 I-270 Corridor							
Elementary	11,698	+ 4 schools	88.8	14,203	+3 schools	93.0	
Junior High	4,375	+ 2 schools	102.7	5,587	+1 school	104.2	
Senior High	<u>5,779</u>	+ 1 school	97.9	<u>6,787</u>	+1 school	95.6	
F-3 Total	21,852			26,577			
F-4 Rural							
Elementary	3,601	-	95.3	4,391	+2 schools	85.8	
Junior & Senior High	<u>2,129</u>	-	98.3	<u>2,540</u>	-	102.4	
F-4 Total	5,730			6,931			
GRAND TOTAL	<u>116,413</u>			<u>124,938</u>			

ALTERNATIVE 2

PUBLIC SCHOOL ANALYSIS

	1980		1980	1985		1985
	<u>Enrollment</u>	<u>Action</u>	<u>% Capacity</u>	<u>Enrollment</u>	<u>Action</u>	<u>% Capacity</u>
F-1 Inner Suburbs						
Elementary	18,261	- 5 schools		20,829	-	
Junior High	9,757	- 2 schools	77.7	10,239	-	81.6
Senior High	<u>10,518</u>	- 1 school	89.9	<u>9,753</u>	-	83.4
F-1 Total	38,536			40,821		
F-2 Outer Suburbs						
Elementary	29,155	-	73.9	33,038	-	83.8
Junior High	10,291	- 1 school	74.9	11,361	-	82.6
Senior High	<u>14,161</u>	-	83.5	<u>13,500</u>	- 1 school	88.5
F-2 Total	53,607			57,899		
F-3 I-270 Corridor						
Elementary	9,831	+ 1 school	88.1	10,127	-	91.48
Junior High	2,778	-	65.2	3,062	-	71.8
Senior High	<u>4,461</u>	-	94.9	<u>4,545</u>	-	96.7
F-3 Total	17,070			17,734		
F-4 Rural						
Elementary	3,664	-	96.93	4,370	+ 2 schools	84.4
Junior & Senior High	<u>2,158</u>	-	87.1	<u>2,921</u>	+ 1 school	81.6
F-4 Total	5,822			7,291		
GRAND TOTAL	115,035			123,745		

ALTERNATIVE 3

PUBLIC SCHOOL ANALYSIS

	1980		1980		1985		1985
	<u>Enrollment</u>	<u>Action</u>	<u>%</u>	<u>Capacity</u>	<u>Enrollment</u>	<u>Action</u>	<u>%</u>
F-1 Inner Suburbs							
Elementary	16,756	-11 schools	70.9		17,874	-	75.6
Junior High	9,244	- 3 schools	81.0		9,169	-	80.4
Senior High	<u>10,118</u>	- 1 school	86.5		<u>8,920</u>	-	76.2
F-1 Total	36,118				35,963		
F-2 Outer Suburbs							
Elementary	26,168	- 7 schools	72.8		26,881	-	74.8
Junior High	9,262	- 3 schools	79.6		9,094	-	78.2
Senior High	<u>13,376</u>	-	78.9		<u>11,760</u>	- 1 school	78.3
F-2 Total	48,806				47,735		
F-3 I-270 Corridor							
Elementary	13,751	+ 8 schools	86.1		18,509	+ 5 schools	95.1
Junior High	5,071	+ 1 school	94.6		7,139	+ 2 schools	94.4
Senior High	<u>3,668</u>	-	78.0		<u>5,321</u>	+ 1 school	90.2
F-3 Total	22,490				30,969		
F-4 Rural							
Elementary	3,719	+ 1 school	83.1		4,547	+ 1 school	86.1
Junior & Senior							
High	<u>2,202</u>	-	88.8		<u>2,367</u>	-	95.4
F-4 Total	5,921				6,914		
GRAND TOTAL	<u>113,335</u>				<u>121,581</u>		

ALTERNATIVE 4

PUBLIC SCHOOL ANALYSIS

	1980		1980		1985		1985
	<u>Enrollment</u>	<u>Action</u>	<u>%</u>	<u>Capacity</u>	<u>Enrollment</u>	<u>Action</u>	<u>%</u>
F-1 Inner Suburbs							
Elementary	16,474	-12 schools	71.2		15,818	- 2 schools	71.5
Junior High	9,148	- 3 schools	80.2		8,468	- 1 school	82.5
Senior High	<u>10,043</u>	- 1 school	85.8		<u>8,358</u>	- 1 school	85.7
F-1 Total	35,665				32,644		
F-2 Outer Suburbs							
Elementary	25,131	-11 schools	76.6		23,587	- 3 schools	76.0
Junior High	8,904	- 4 schools	84.2		7,278	- 1 school	76.5
Senior High	<u>13,103</u>	- 1 school	85.8		<u>10,849</u>	- 1 school	80.0
F-2 Total	47,138				41,714		
F-3 I-270 Corridor							
Elementary	11,882	+ 3 schools	95.3		13,777	+ 3 schools	94.6
Junior High	4,472	+ 1 school	83.4		5,545	-	103.5
Senior High	<u>5,805</u>	+ 1 school	98.4		<u>6,744</u>	+ 1 school	94.9
F-3 Total	22,159				26,066		
F-4 Rural							
Elementary	3,317	-	87.8		3,987	+ 1 school	89.0
Junior & Senior							
High	<u>1,956</u>	-	78.9		<u>2,262</u>	-	91.2
F-4 Total	5,273				6,249		
GRAND TOTAL	<u><u>110,235</u></u>				<u><u>106,673</u></u>		

ALTERNATIVE 5

PUBLIC SCHOOL ANALYSIS

		1980		1980	1985		1985
		<u>Enrollment</u>	<u>Action</u>	<u>% Capacity</u>	<u>Enrollment</u>	<u>Action</u>	<u>% Capacity</u>
F-1	Inner Suburbs						
	Elementary	18,319	- 7 schools	71.4	17,405	- 3 schools	72.1
	Junior High	9,776	- 2 schools	77.9	9,706	-	77.3
	Senior High	<u>10,534</u>	- 1 school	90.0	<u>9,320</u>	-	79.7
	F-1 Total	38,629			36,431		
F-2	Outer Suburbs						
	Elementary	27,780	- 5 schools	76.4	28,599	-	78.7
	Junior High	9,814	- 1 school	71.4	9,751	-	70.9
	Senior High	<u>13,802</u>	-	81.4	<u>12,274</u>	- 1 school	80.4
	F-2 Total	51,396			50,624		
F-3	I-270 Corridor						
	Elementary	12,835	+ 7 schools	84.1	20,887	+ 9 schools	96.8
	Junior High	4,758	+ 1 school	88.8	7,849	+ 3 schools	90.6
	Senior High	<u>6,084</u>	+ 1 school	103.1	<u>8,623</u>	+ 3 schools	90.8
	F-3 Total	23,677			37,359		
F-4	Rural						
	Elementary	3,741	+ 1 school	83.5	4,580	+ 1 school	88.4
	Junior & Senior						
	High	<u>2,216</u>	-	89.4	<u>2,673</u>	-	107.8
	F-4 Total	5,957			7,253		
GRAND TOTAL		<u>119,659</u>			<u>131,677</u>		

TRANSPORTATION ASSUMPTIONS BASE CASE REPORT

In conformance with the Planning Board's instructions during the worksessions of June 16-20, a "base case" study was performed for the transportation subsystem. The following assumptions were made in determining transportation facility and service location, capacity, staging, and cost for the period FY 76-85.

A. Streets and Highways

1. Capital Improvements

- a. The existing (1975) highway system is supplemented by all capital improvement projects listed in the adopted County CIP, for the period FY 76-81. The per capita expenditures by each funding source for each fiscal area during the period FY 76-81 were assumed to stay constant for each year during the period FY 82-85. Thus, capital expenditures in each alternative increased in direct proportion to the population increases during the period FY 82-85.
- b. The existing (1975) highway system is further supplemented by all capital improvement projects in the State's Five-Year Highway Improvement Program, for the period FY 76-80. Using the trend forecast population, per capita expenditures were calculated for the period FY 76-80 and were assumed to remain constant for each year during the period FY 81-85. Again, capital expenditures in each alternative increased in direct proportion to the population increases during the period FY 82-85.

2. Operating Costs

- a. Operating cost estimates for the Montgomery County Department of Transportation were taken from the proposed County PSP for the period FY 76-81. The trend for such costs was extended into the period FY 82-85. Since the PSP did not consider these costs sensitive to population increases, they were applied uniformly to all alternatives on a county-wide basis.
- b. Operating cost estimates for the State Highway Administration were derived from District #3 tabulations and projections. Since these costs were considered somewhat sensitive to population increases, the average per capita expenditure for FY 71-75 was assumed to hold constant for each year during FY 76-85. Thus, these expenditures were increased in direct proportion to population increases during FY 76-85.

B. Transit

1. Capital Improvements

- a. All transit capital costs as delineated in CIP were included in the base case analysis for the period FY 76-81. Average per capita expenditures by funding source and by fiscal area during the period FY 76-81 were held constant for the period FY 82-85. Capital expenditures, therefore, were assumed to increase in direct proportion to population growth. During FY 82-85, replacement minibuses and vans would be purchased for Project TRIP.

- b. Capital costs for Metrobus in the region are divided into 80% federal, 20% local shares. Montgomery County is assessed 12% of this local share of which 75% is paid by the State and the remaining 25% is actually paid by the County. The net project cost to the County is 1/2 of 1 percent of the total capital cost for the region. It is assumed that during FY 82-85, 200 replacement Metrobuses per year will be purchased for the region with no net fleet additions.
- c. No assumptions were made for the Federal and State share of the Metrorail capital costs. Any estimate must be based upon the Adopted ARS estimate of \$2.98 billion approved by the jurisdictions in 1969. Due to the numerous complexities involved, any estimate is meaningless.
- d. The only County commuter rail expenditure is the share of the costs of station improvements listed in the CIP. No funds are included for debt service or maintenance in the PSP.

2. Operating Costs

- a. County transit operating costs include expenses for the county share of Metrorail debt service, Metrobus operating deficits, and WSTC. While it is assumed that Project TRIP programs will not be expanded, the initial minibuses in TESS and Bethesda-Friendship Heights and Dial-A-Bus in Gaithersburg, Rockville, Wheaton, and the up-county area are assumed to continue through FY 85.

COUNTY CIP EXPENDITURES
FROM ALL FUNDING SOURCES

	CIP FY 76-81		ALT 1 FY 82-86		ALT 2 FY 82-86		ALT 3 FY 82-86		ALT 4 FY 82-86		ALT 5 FY 82-86	
	\$(x1000)	%	\$(x1000)	%	\$(x1000)	%	\$(x1000)	%	\$(x1000)	%	\$(x1000)	%
Streets & Highways	69,133 (52,177)	33	65,115	47	65,115	47	65,115	47	58,603	44	69,022	48
Bus & Commuter Rail	3,409 (1,129)	2	2,994	2	2,994	2	2,994	2	2,694	2	3,174	2
Bikeways & Pedestrian Facilities	6,661 (6,001)	3	6,736	5	6,736	5	6,736	5	6,063	5	7,140	5
METRO	130,845 (721)	62	64,422	46	64,422	46	64,422	46	64,422	49	64,422	45
TOTAL	210,048 (60,028)	100	139,267	100	139,267	100	139,267	100	131,782	100	143,758	100

COUNTY PSP EXPENDITURES
FROM ALL FUNDING SOURCES

	PSP FY 76-81	ALT 1 FY 82-86	ALT 2 FY 82-86	ALT 3 FY 82-86	ALT 4 FY 82-86	ALT 5 FY 82-86
	\$(x1000)	\$(x1000)	\$(x1000)	\$(x1000)	\$(x1000)	\$(x1000)
Minor Road Projects Maintenance, & Adminis- tration	69,801 (69,801)	58,750	58,750	58,750	58,750	58,750
Project TRIP	21,516 (21,516)	0	0	0	0	0
METRO	87,976 (51,565)	109,293	109,293	109,293	109,293	109,293
TOTAL	179,293 (142,882)	168,043	168,043	168,043	168,043	168,043

Note: Numbers in parentheses are County Expenditures

STATE 5-YEAR HIGHWAY IMPROVEMENT PROGRAM EXPENDITURES

	PROGRAM FY 76-80	ALT 1 FY 81-86	ALT 2 FY 81-86	ALT 3 FY 81-86	ALT 4 FY 81-86	ALT 5 FY 81-86
	\$(x1000)	\$(x1000)	\$(x1000)	\$(x1000)	\$(x1000)	\$(x1000)
HIGHWAYS	45,975	62,429	62,429	62,429	56,089	66,054

STATE HIGHWAY OPERATING EXPENDITURES

	ALT 1 FY 76-86	ALT 2 FY 76-86	ALT 3 FY 76-86	ALT 4 FY 76-86	ALT 5 FY 76-86
	\$(x1000)	\$(x1000)	\$(x1000)	\$(x1000)	\$(x1000)
MINOR PROJECTS, MAINTENANCE, & ADMINISTRATION	48,267	48,267	48,267	46,437	49,293

- b. Federal participation in the funding of Metro-bus operating costs is scheduled to terminate in 1980. No extension was developed; nor is such an extension planned for by the County Executive. State and local contributions were assumed to be a continuation of the trend in the PSP.
- c. No operating deficit was assumed for the Metro-rail system. The total cost of the system was taken at \$2.98 billion. The extra \$1.5 billion in escalated ARS system cost has not been allocated, but it is assumed that it will be taken care of somewhere, somehow.

C. Parking Facilities

Since County parking facilities are essentially self-supporting, they would not create a burden to the average tax-payer. For this reason, parking facilities costs were excluded from the base case analysis.

D. Bikeways, Pedestrian Facilities, and Miscellaneous Transportation Facilities and Services

- 1. Capital and operating costs for bikeways and pedestrian facilities during FY 76-81 were obtained from the CIP and PSP. Average per capita expenditures for capital improvements were calculated for the period FY 76-81, and assumed to remain constant for the period FY 82-85. Thus, capital costs were increased in direct proportion to population growth during FY 82-85. PSP costs for FY 82-85 were assumed to follow the trend of FY 76-81.

2. Miscellaneous transportation expenses, such as traffic control devices, intersection improvements, and bridge repair were also included in the analysis. Inputs included CIP estimates for these items for FY 76-81 plus proportional increases during FY 82-85 to account for population growth.

ENVIRONMENT -

WSSC SUBSYSTEM, SOLID WASTE AND STORMWATER SUBSYSTEMS

A. ASSUMPTIONS

1. General

- a. Growth Alternatives 1, 4, and 5 were sufficient to provide significant differentiation for the purposes of study. County wide population and employment totals for Growth Alternatives 2 and 3 were the same as Growth Alternative 1. Data representing "demand" were generated on a County wide basis, and the major facilities representing "supply" were County wide projects.
- b. C.I.P. items were divided into two time periods. FY 76-81 were the items given, and approved by the Planning Board, in the most current C.I.P. FY 82-85 represents the second time period, the "stretch out" period, where repeating projects were projected proportionately to population.

2. Water

- a. Per capita water consumption figure, and per employee use figure are valid over time. It is assumed that water savings devices will offset increases in consumer demand, thus leaving the rate constant.
- b. A relationship exists between number of employees and commercial-industrial use.
- c. The percent of system losses will remain constant over time.

- d. The percent of served population to total population for the County will remain constant over time.
- e. The percent of Montgomery County's share of water consumed to total consumption in the WSSC system will remain constant over time.
- f. There will be repeating and non-repeating C.I.P. items in the time period of study. The first time period, FY 76-81, contains the C.I.P. items presently given, the second time period, FY 81-85 (Stretch out period), contains projected C.I.P. items. Non-repeating items include major projects that will occur once: improvements to the Potomac Filtration plant, line W-80, service centers, and designated County-wide projects. Repeating items, those projected for the stretch-out period, include lines, pumps and storage.
- g. The following points relate to operating costs for water facilities.
 - (1) New lines, pumps and storage facilities will have no operating costs during the time period of study.
 - (2) Two new plant improvements are part of existing structures. Operating costs are not increased as a result of the improvements.

3. Sewage

- a. Per capita sewage flow figure, and per employee sewage flow figure are valid over time. It is assumed that water savings devices that reduce

flow will offset increases in consumer use.
The flow rate will remain constant.

- b. Infiltration and inflow figures were held constant over time, as recommended by the Planning Board.
 - c. There will be repeating and non-repeating C.I.P. items in the time period of study. The first time period, FY 76-81, contains the C.I.P. items presently given, the second time period, FY 81-85 (Stretch out period), contains projected C.I.P. items. Non-repeating items include major projects that will occur only once: A.W.T. plant and delivery system, improvements to Blue Plains, interim treatment plants, improvements to Damascus, project S-22.1, and designated County-wide projects. Repeating items, those projected for the stretch-out period, include lines and pumps.
 - d. The following points relate to operating costs for sewage facilities.
 - (1) New lines and pumps will have no operating costs during the time period of study.
 - (2) Plant improvements are part of existing structures. Operating costs are not increased as a result of the improvements.
4. WSSC Budget (Water and Sewage)
- a. Sources of revenues will remain constant over-time. Each source's share, or contribution, will remain at a constant percentage, equivalent

to conditions in FY 75. Other percentages over the last five years were compared and found to be similar to FY 75. Projected figures, representing future sources and percent contribution for Montgomery County, are not available.

- b. Rates were based on total water consumption as determined previously.
- c. Average household charges; assumed a per capita water consumption figure of 67 gcd, multiplied by interpolated figures on persons per dwelling unit for each year.

5. Solid Wastes

- a. The Pope, Evans and Robbins' study on the ten year solid waste plan represented figures on solid waste generated which were assumed correct for Alternative 1.
- b. A per capita solid waste figure was developed from the Pope, Evans and Robbins study, and applied to population figures for Alternatives 4 and 5.
- c. There will be only non-repeating C.I.P. items in the time period of study. The first time period, FY 76-81, contains the C.I.P. items presently given, the second time period, FY 81-85 (Stretch-out period), contains projected C.I.P. items. Non-repeating items include major projects that will occur only once: three landfills, rail haul, pathological wastes, central processing facility, fuel handling facility, landfill reclamation, future landfill, and

new collection system.

6. Stormwater

- a. Thirty-six projects are given in the C.I.P., and were approved to be included in the study. All are considered to be repeating, and are projected proportionately to the number of dwellings.
- b. It is assumed that there are no operating costs or revenues for stormwater projects.

B. DATA NOTES

1. Subsystem: WSSC

Component: Water.
Component: Sewage.

2. Subsystem: Sanitation and Conservation

Component: Solid Wastes.
Component: Stormwater.

3. Basic Methodology

a. Part A, Needs or Demands

- (1) Population and Employment Projections
1975
1980 Alternative #1 (Med. Growth)
Alternative #4 (Low Growth)
Alternative #5 (High Growth)

1985 Alternative #1 (Med. Growth)
 Alternative #4 (Low Growth)
 Alternative #5 (High Growth)

(2) Projections by Alternatives
 Translated (Direct Relationships):

- (a) Sewage Generated 67 gcd.
- (b) Water Consupmtion 125 gcd.
- (c) Solid Wastes Generation 5-6lbs.

b. Part B, Supply (Projects and Facilities)

- (1) Present Systems Capability.
- (2) Approved Items in C.I.P.
- (3) Approved Additional Items.

c. Part C, Costs

- (1) Capital, Operating, Revenue.
- (2) Explanation of cost estimating methodologies.

d. Part D, Fiscal Impact, Budget

SUBSYSTEM: WSSC
COMPONENT: WATER

4. Demand (Water Consumption)

a. Given: Oct. 1974 figures, "Total WSSC"

- (1) Served population
- (2) Commercial-industrial use
- (3) System loss
- (4) Total WSSC consumption

From: WSSC, Metcalf and Eddy, "Analysis of
Recent WSSC Sewage Flow Tributary to
Blue Plains Plant"

b. / Given: Montgomery County (and Prince George's
County) Employment figures

From: M-NCPPC, Research Division

c. Calculate: "Sub total", (Total WSSC consumption-System loss).

d. Calculate: "Domestic Use", (Sub Total -
Commercial-industrial use)

e. Based on total WSSC figures,
Calculate:

- (1) Per capita domestic consumption: 0.0000759
- (2) Per employee consumption: 0.0000367
- (3) Percent system loss: 13.5350%

Estimate:

- (1) Served population to total population:
94.2656%
- (2) Montgomery County share total WSSC system:
46.9686%

f. Given: Projections: Population and Employment
1975, 1980, 1985 (Montgomery County)

- (1) Application served population percent to
total population.
- (2) Application per capita domestic and per
employee consumptions ratios to served
population and employment figures 1975, 1980,
1985.
- (3) Application percent system loss to determine
Montgomery County total consumption.
(Sub Total + 46.9686% X = X).

g. Calculate: Total WSSC Consumption
Alt. #1, 1975, 1980, 1985.

- (1) Application Montgomery County share to total
WSSC system.

5. Supply (Projects and Facilities)
Approved items by Planning Board.

a. Filtration Plants

- (1) Two improvement items to Potomac Filtration Plant.
- (2) Eliminate Seneca Creek Filtration Plant.
- (3) Differ W-133 Cross County Project after study phase (beyond 1985), (need comprehensive water supply plan).
- (4) Non-repeating items.

b. Line W-80

- (1) Supply line to Prince George's County.
- (2) Non-repeating item.

c. County-Wide Projects

- (1) Four items.
- (2) Repeating items.

d. Lines

- (1) Twenty items.
- (2) Repeating items.

e. Pumps

- (1) Three items.
- (2) Repeating items.

f. Storage

- (1) Ten items.
- (2) Repeating items.

g. Service Centers

- (1) Three items.
- (2) Non-repeating items.

6. Costs

a. Capital

(Existing C.I.P. approved items - Six years
Stretch-out period - four years.)

(1) Plants

- (a) Costs given in C.I.P. by year.
- (b) Non-repeating
- (c) Same for all alternatives.

(2) Line W-80

- (a) Costs given in C.I.P. by year.
- (b) Non-repeating.
- (c) Same for all alternatives.

(3) County-Wide Projects

- (a) Costs given in C.I.P. by year.
- (b) Repeating:

Total costs FYs 76-81 ÷ new DUs
served FYs 76-81, = per new DU
cost.

Per new DU cost X new DUS served
FYs 82-85, = Total Costs FYs 82-85.

Total costs FYs 82-85 \div 5, = per
year cost for stretch-out period.

(c) Varies for each alternative.

(4) Lines (as above).

(5) Pumps (as above).

(6) Storage (as above).

(7) Service Centers

(a) Costs given in C.I.P. by year.

(b) Non-repeating.

(c) Same for all alternatives.

b. Operating

(1) Assumptions:

(a) New lines, pumps, storage assumed no
operating costs.

(b) New plant improvements part of existing
structures.

(c) Service center operating costs included
in PSP FY 76-81.

(d) Existing, and given C.I.P. related
operating costs continued FY 82-85.

PSP given operating costs FY 76-81.

Yearly percent increase determined
and applied yearly, FY 82-85.

(2) Operating costs same for all alternatives.

c. Revenues

- (1) Revenue FY 76 given PSP
Revenue per DU served determined FY 76.
- (2) Application revenue per DU served to future
DU served figures.
- (3) Revenue costs vary for each alternative.

7. Budget

- a. The MUNIES program took the calculated: capital requirements, operating costs, and revenues and computed yearly figures, for each alternative.
 - (1) The capital requirements, minus the monies received from non-County sources, were translated into new debt service. New debt service represents the principal and interest on the Bonds needed to pay for capital items.
 - (2) The operating requirements were taken directly from inputted data.
 - (3) Revenues reflect present rates held constant.
- b. Combined WSSC budgets were handled separately, from other County subsystems.

SUBSYSTEM: WSSC
COMPONENT: SEWAGE

8. Demand (Sewage Flow)

- a. Given: October 1974 figures, Montgomery County

- (1) Percent served population
- (2) Domestic flow
- (3) Commercial-industrial flow
- (4) Infiltration and inflow.

From: WSSC, Metcalf and Eddy, "Analysis of Recent WSSC Sewage Flow Tributary to Blue Plains Plant".

b. Given: Montgomery County:

- (1) Total DUs
- (2) Total population and employment.

From: M-NCPPC, Research Division.

- c. Calculate: "Total Average Flow", (Dom. flow and commercial-industrial flow and I&I).
- d. Calculate: "Peak Flow", (application peak flow curve to total average flow - WSSC).
- e. Based on 1975 WSSC figures Calculate:
 - (1) Per capita domestic flow: 0.0000669.
 - (2) Per employee flows: 0.0000376.
 - (3) Infiltration and inflow held constant.

Estimate:

(4) Served population

- (a) Served population to total population:
89.4647%. (Present situation).
- (b) New DUs added if in service envelope

<u>All.</u>	<u>1975-80</u>	<u>1980-85</u>
#1	13.8%	12.8%
#4	21.8%	28.7%
#5	10.7%	9.7%

DUs converted to served population.

f. Given: Projections: Population and Employment
1975, 1980, 1985. (Montgomery County)

- (1) Application per capita domestic and per
employee consumption ratios to served pop-
ulation and employment figures. 1975, 1980,
1985.
- (2) Infiltration and inflow held constant also,
infiltration and inflow constants reduced by
36.36%.

8. Supply (Projects and Facilities)
Approved items by Planning Board.

a. AWT Plant.

- (1) Item for all allocations, on-line 1980.
- (2) Non-repeating item.

b. AWT Delivery line.

- (1) Item for all alternatives, on-line 1980.
 - (2) Non-repeating item.
- c. Blue Plains Improvements
 - (1) Non-repeating item.
- d. Seneca Interim Plant
 - (1) Non-repeating item.
- e. Damascus Plant Improvements.
 - (1) Non-repeating item.
- f. S-22.1 Relief line (D.C.)
 - (1) Non-repeating item.
- g. County-Wide Projects
 - (1) Three items.
 - (2) Non-repeating items.
- h. Lines
 - (1) Thirty-one items.
 - (2) Repeating items.

i. Pumps

- (1) Five items.
- (2) Repeating items.

9. Costs

a. Capital

(Existing C.I.P. approved items - 6 years
Stretch-out period - 4 years)

(1) AWT Plant

- (a) Costs given in C.I.P. by year.
- (b) Non-repeating
- (c) Same for all alternatives.

(2) AWT Delivery Line

- (a) Costs given in C.I.P. by year.
- (b) Non-repeating
- (c) Same for all alternatives.

(3) Blue Plains Improvements

- (a) Costs given in C.I.P. by year.
- (b) Non-repeating
- (c) Same for all alternatives.

(4) Seneca Interim Plant

- (a) Costs Given in C.I.P. by year.
- (b) Non-repeating
- (c) Same for all alternatives.

(5) Damascus Plant Improvements

- (a) Costs given in C.I.P. by year.
- (b) Non-repeating
- (c) Same for all alternatives.

(6) S-22.1 Relief Line (D.C.)

- (a) Costs given in C.I.P. by year
- (b) Non-repeating
- (c) Same for all alternatives.

(7) County-Wide Projects

- (a) Costs given in C.I.P. by year
- (b) Repeating:

Total costs FYs 76-81 \div new DUs
served FYs 76-81 = per new DU cost.

Per new DU cost X new DUs served
FYs 82-86 = Total costs FYs 82-86.

Total costs FYs 82-86 \div 5 = per
year cost for stretch-out period.

- (c) Varies for each alternative.

(8) Lines (As above)

(9) Pumps (As above)

b. Operating

(1) Assumptions:

- (a) PSP given operating costs FY 76.

- (b) Operating costs FY 76 \div DUs served
= per DU served operating costs.
- (c) Per DU served operating costs X DUs
served FYs 77-86 by year = yearly
operating costs FYs 77-78.

(2) Varies by alternative.

c. Revenues

(1) Revenues Type A (user charges)

- (a) PSP given revenues FY 76.
- (b) Revenues FY 76 \div DUs served = per DU
served operating costs.
- (c) Per DUs served revenues X DUs served
FYs 77-86 by year = yearly revenues
FYs 77-86.

(2) Varies by allocation

(3) Revenues Type B (Front-foot benefit charges)

- (a) PSP given revenues FY 76
- (b) Revenues FY 76 \div DUs served = per DU
served revenues.
- (c) Per DU served revenues X DUs served
FYs 77-86 by year = yearly revenues
FYs 77-86.

(4) Varies by allocation.

10. Budget

- a. The MUNIES program took the calculated: capital
requirements, operating costs, and revenues and

and computed yearly figures, for each alternative.

- (1) The capital requirements, minus the monies received from non-County sources, were translated into new debt service. New debt service represents the principal and interest on the bonds needed to pay for capital items.
 - (2) The operating requirements were taken directly from inputted data.
 - (3) Revenues reflect present rates held constant.
- b. Combined WSSC budgets and rates are presented.
- (1) For each year, for each alternative revenues needed are determined.
 - (a) Revenues needed for water include new debt service and operating requirements.
 - (b) Revenues needed for sewage include new debt service and operating requirements.
 - (c) Existing debt service is also included.
 - (2) Revenues needed, for each year, for each alternative are partly paid for by user rates.
 - (a) Of present revenues, FY 1975, 32.6402% come from sewer use charges, 29.0406% come from water consumption charges. Similar percentages over the last five years were compared and found to be similar to the present figures. Projected figures, representing future sources, are not available.

- (b) Rates were based on total water consumption and revenues needed to be derived from water and sewer charges.
- (c) Average household costs were also computed

SUBSYSTEM: SANITATION AND CONSERVATION
COMPONENT: SOLID WASTES

11. Demand (Solid Wastes Generation)

a. Given: Nov. 1972 figures (projected),

- (1) 1,000 tons per year by drainage basin, 1972-84.
- (2) Trend projected for column representing 1985.

From: Pope, Evans, Robbins, for Montgomery County, Md. "Solid Wastes Management Ten Year Plan," Vol. 7, Nov. 1972.

b. Calculate:

- (1) Population figures by Pope, Evans, Robbins alternative #1, 1975, 1980, 1985. (5% error total, 1% by basin)
- (2) Establish per capita solid wastes generated for alternative #1, 1975, 1980, 1985.
- (3) Apply per capita solid wastes generated 1975 to alternative #4, #5 population 1975-77.
- (4) Apply per capita solid wastes generated 1980 to alternative #4, #5 population 1978-82.

- (5) Apply per capita Solid wastes generated 1985 to alternative #4, #5 population 1983-85.

12. Supply (Projects and Facilities)
Approved items by Planning Board.

a. Fairland and Gude landfills.

- (1) Non-repeating items.

b. Any landfill

- (1) Non-repeating item.

c. Rail Haul System

- (1) Non-repeating item.

d. Central Processing Facility

- (1) Non-repeating item.

e. Fuel Handling Facility

- (1) Non-repeating item.

f. Pathological Wastes System (Incinerator)

- (1) Non-repeating item.

g. Landfill Reclamation

- (1) Non-repeating item.

h. Future landfill.

(1) Non-repeating item.

i. Collection Program

(1) Special item, no capital costs

(2) Repeating operating costs and revenues
FY 79-86.

13. Costs

a. Capital

(Existing C.I.P. approved items - 6 years
Stretch-out period - 4 years)

(1) Fairland and Gude landfills

(a) Costs given in C.I.P. by year

(b) Non-repeating

(c) Same for all allocations

(2) Any landfill

(a) Costs given in C.I.P. by year

(b) Non-repeating

(c) same for all allocations

(3) Rail Haul System (as above)

(4) Central Processing Facility (as above)

(5) Fuel Handling Facility (as above)

(6) Pathological Wastes System (as above)

- (7) Landfill Reclamation (as above)
- (8) Future landfill (as above)
- (9) Collection Program - no capital costs

b. Operating

- (1) Given: PSP figures were used.
- (2) New operating costs for C.I.P. items indicated in C.I.P.
 - (a) on-line dates given
 - (b) constant for all alternatives
- (3) New operating costs for Collection Program
 - (a) PSP given costs for DUs served 1975
operating costs 1975 \div DUs served
(150,000) = cost per DU
 - (b) After FY 79, 67.19% DUs served. DUs
served X cost per DU = operating costs
for Collection Program.
 - (c) Varies for each alternative.

c. Revenues

- (1) Existing PSP figure \$5,746 held constant
for all alternative.
- (2) New revenues for C.I.P. items indicated in
C.I.P.
 - (a) On-line dates given
 - (b) Constant for all alternatives.

(3) New revenues for Collection Program.

- (a) PSP given revenues for DUs served 1975
revenues 1975 \div DUs served (\approx 150,000)
= revenues for DU
- (b) After FY 79, 67.19% DUs served. DUs
served X revenues per DU = revenues
for Collection Program.
- (c) Varies for all alternatives.

14. Budget

- a. The MUNIES program took the calculated capital requirements, operating costs, and revenues and computed yearly figures, for each alternative.
 - (1) The capital requirements, minus the monies received from non-County sources, were translated into new debt service. New debt service represents the principal and interest on the bonds needed to pay for capital items.
 - (2) The operating requirements were taken directly from inputted data.
 - (3) Revenues reflect present rates held constant.
- b. The component is a part of General Government, detailed budgets were included there.

SUBSYSTEM: SANITATION AND CONSERVATION
COMPONENT: STORMWATER

15. Demand (Stormwater non-quantifiable)

16. Supply (Projects and facilities)

a. 36 C.I.P. Projects

- (1) 4 stormwater management studies
- (2) 4 impoundments
- (3) 4 waterway improvements
- (4) 24 storm drains

17. Costs

a. Capital

- (1) All items in C.I.P. given FYs 76-81.
- (2) Repeating:
 - (a) Total costs FYs 76-81 \div new DUs
FYs 76-81. = per new DU cost
 - (b) Per new DU cost X new DUs FYs 82-86
= total costs FYs 82-86
 - (c) Total costs FYs 82-86 \div 5 = per year
cost for stretch-out period.
 - (d) Varies for all alternatives.

b. Operating
None

c. Revenue
None

18. Budget

- a. The MUNIES program took the calculated: capital requirements, operating costs, and revenues and computed yearly figures, for each alternative.
 - (1) The capital requirements, minus the monies received from non-County sources, were translated into new debt service. New debt service represents the principal and interest on the bonds needed to pay for capital items.
 - (2) The operating requirements were taken directly from inputted data.
 - (3) Revenues reflect present rates held constant.
- b. The component is a part of General Government, detailed budgets were included there.

C. CONCLUSIONS

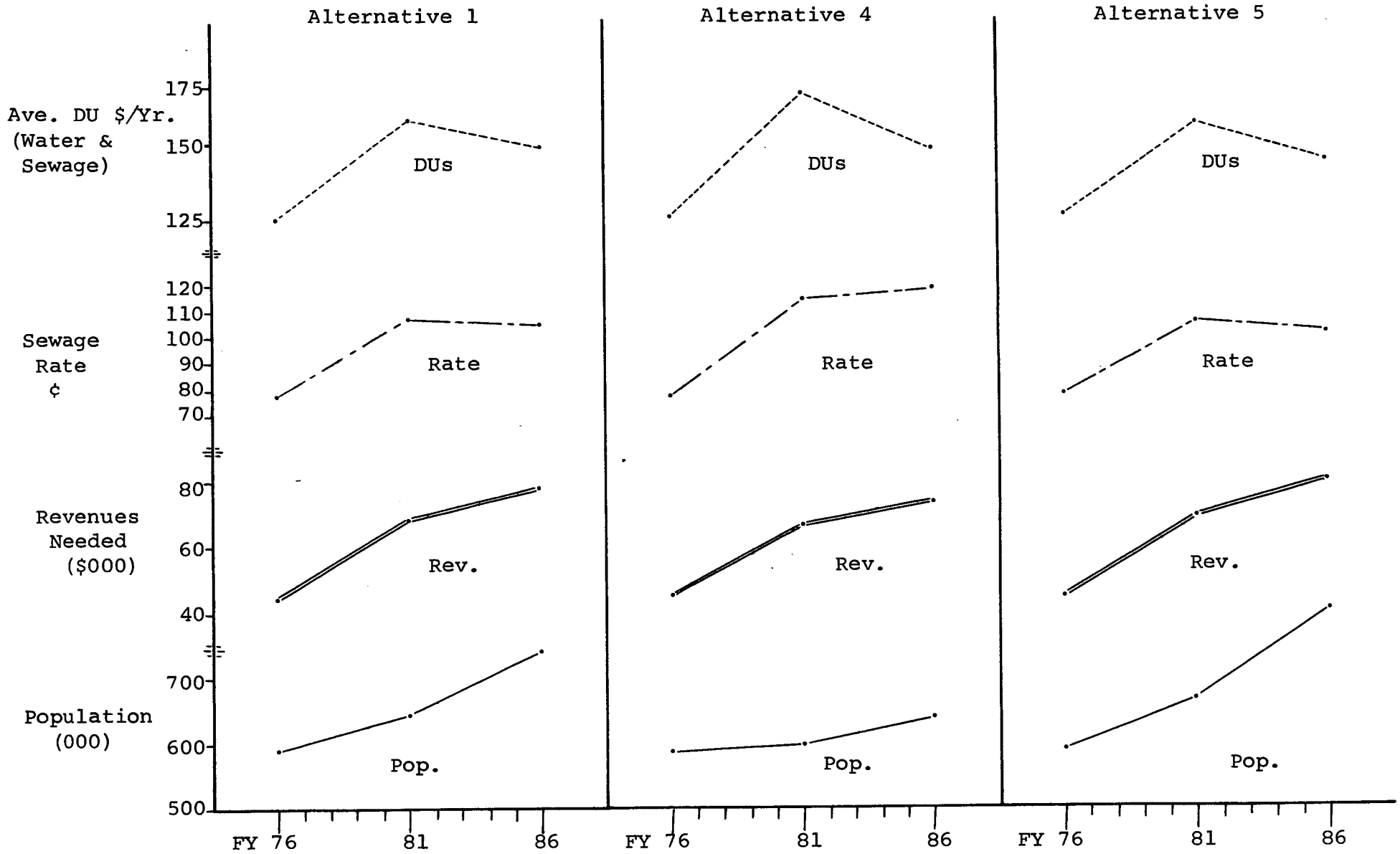
1. Costs for sewage facilities and projects are insignificant in terms of the fiscal impact to the County. Eighty-five percent of all costs for sewage facilities and projects come from Federal or State grants, which were computed as off-set revenues.
2. The water component has the most significant fiscal impact on the County. All costs for water facilities and projects are financed directly through WSSC.
3. Revenues needed for each alternative are as follows:

<u>(\$000)</u>	<u>FY 76</u>	<u>FY 81</u>	<u>FY 88</u>
<u>Alter. #1</u> (med. Growth)	44,684	67,863	77,031
<u>Alter. #4</u> (low Growth)	44,602	66,635	73,154
<u>Alter. #5</u> (high Growth)	44,684	68,494	78,903

The graph, "Comparisons: Water and Sewage", displays the same revenues data. Initially there is little difference between revenues needed for each alternative. By FY 86 the difference between the highest and lowest in \$5 million Alternative 1 is highly similar to Alternative 5.

4. Rates for water and sewage tend to increase significantly during the first three fiscal years, and then tend to level off(see "Comparisons: Water and Sewage"). This is primarily due to the nature of the C.I.P., and the averaging effect of the stretch-out period.
5. With increased populations the rates and average costs per dwelling unit decreases.
 - a. Alternative 4 (low growth) is the most costly in terms of rates and average dwelling unit costs.
 - b. Alternative 5 (high growth) has the lowest rates and average dwelling unit costs.
 - c. Alternative 1 (medium growth) the rates vary only about 5¢ more than Alternative 5.

COMPARISONS: WATER AND SEWAGE



POLICE SUBSYSTEM

The evaluation of the Police subsystem is based on police event activity provided to the Research Division by the Systems Data Section of the Montgomery County Dept. of Police. The analysis reveals that a relationship exists between the number of County police officers and the number of police event activities. County police officers are assigned to areas of the County based upon police event activity. The greater number of events in an area, the more numerous the police officers. Police expenditures by planning area can, therefore, be projected by projecting event activities. A linear regression equation related police event activity by fiscal area to the number of dwelling units by area and this relationship yields a highly significant R^2 of .954.

Police event activity is projected by area to determine the number of police officers and therefore, police expenditures. This is done utilizing a multiple regression equation and independent variables are dwelling units and employment. The resulting R^2 is a significant .952. However, only in area four (4) was it necessary to use both dwelling units and employment to predict police calls. For the other areas dwelling units were a sufficient predictor. We speculate that this statistical relationship is more of an incident in the rural area because Upper Montgomery County by nature is a low density area, with increasing middle class developments and relatively few traffic problems. With very few garden apartments and no high rise structures, the probability of crime related occurrences is less per dwelling unit; therefore, employment becomes more of an indicator for predicting policemen than it did for the remaining areas of the County. Another equation was fitted to the activity data in the PSP to find the relationship between police calls and the number of officers required. This equation was applied to the

appropriate demand base category in each fiscal area to produce the demand for police officers.

The chart below shows under each growth alternative the total number of new police stations. A new station is built by the model when 120 additional policemen are needed as a result of increasing event activity. Alternative number 5 (high up and down-county) shows only one police station complete in the ten year period. Not indicated here are two additional police stations that will be added to alternative number 5 after 1985, with construction started before 1985. This is explained by a 2 year "time delay" factor that is entered into the model. This means that if a new station is required by 1987, construction will begin by 1985, in order to allow a two year construction period. This is a built-in feature of the MUNIES program which is used in this subsystem to aid in determining the timing and cost of capital investment.

<u>Alternative No.</u>	<u>No. of Stations Completed by 1985</u>	<u>Completion Dates</u>
1	2	1979, 1985
2	2	1981, 1984
3	1	1979
4	1	1981
5	1	1979, 1986, 1987

A renovation factor is also implied. When twenty-five new officers are required in a fiscal area, the cost per policeman is automatically calculated from input data and distributed in the budget.

Fiscal year operating cost per policeman is calculated from information presented in the Recommended Public Services Program Fiscal Years 1976-81. A factor was calculated in the

following manner: $\frac{76 \text{ total operating cost}}{76 \text{ total policemen}} = \text{factor}$

In addition, a factor was developed to account for the non-inflationary growth in cost per police officer, which is projected in the PSP. The factor is .1 percent per year.

HEALTH AND SOCIAL SERVICES

The Health and Social Services subsystem includes all the projects which are listed in the adopted Capital Improvements Program, 1976-1981. In addition, the entire operating budgets of the Health and Social Services are also included in the analysis as shown in the proposed Public Services Program.

A. Methodology - Capital Costs

Capital expenditures for health and social services for the first six years (1976-1981) were unchanged from total costs specified in the Capital Improvements Program. The level of capital costs did not vary with any of the alternative growth assumptions.

However, during the latter part of the study period (1982-1985), an average per capita measure was derived from the previous six-year Capital Improvements Program and was utilized to compute future capital costs.

B. Operating Expenditures

Operating costs for the health and social services systems for the first six years were developed separately from linear regression models. For the health and social services systems, operating costs as a function of population was utilized in order to obtain per capita expenditure measures in 1976. The results were inputted directly into the model and served in calculating total yearly costs for the five growth alternatives.

Future operating expenditures were obtained by taking a six-year (1976-1981) per capita measure which related expenditures to population and the result was trended out for the remainder of the study period (to 1985).

Included in the analysis was an estimate of the growth factors which reflected improved level of service. The factors were developed by comparing activity data and expenditures as published in the PSP. To determine these factors, a curvilinear regression function of $Y = ab^X$ was utilized for each growth alternative. These regressions estimated the service level growth rates per unit of demand. For both health and social service systems, growth in operating costs per unit of population was estimated from the Public Services Program as projected for the period 1976 to 1980.

C. Revenue Estimates and Revenue Offsets

Revenue estimates for this subsystem for the first six years (1976-1981) were made from examination of the PDF's which were contained in the CIP (1976-1981) document.

To obtain revenue estimates for 1982-1985, it was assumed that the same level of financing as observed during the earlier phase would continue. The principal source of funds for this subsystem came in the form of County Bond revenues. This accounted for 44.4% of the total operating costs. Additional revenues were received as State aid for the Gaithersburg Central Health Clinic.

MONTGOMERY COLLEGE SUBSYSTEM

A. Introduction

This subsystem covers the expenses and revenues of the Montgomery College system. The need for facilities and the operating costs and revenues were determined from projections of full-time and part-time enrollment. The College's own projections were used for the alternative #1 trend forecast but new projections had to be made for the remaining four alternatives.

B. Assumptions and Methodology

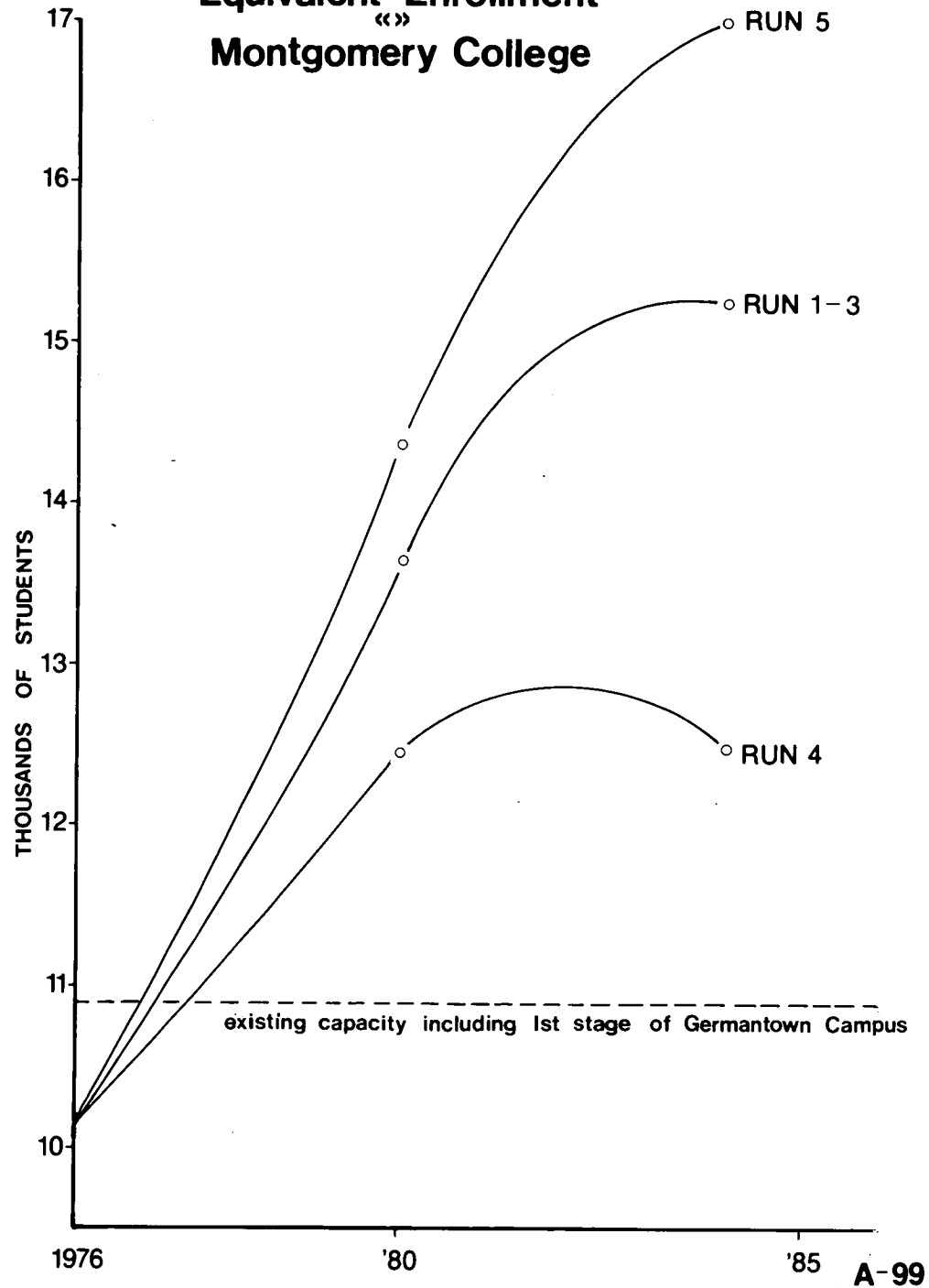
1. Enrollment

A major tool in deriving population projections by age was the demographic model. The projections made by the College administration were first turned into participation rates by age. These participation rates were then used to estimate enrollment for the four other alternatives using the demographic model. The following graph shows the enrollment for each of the five alternatives for Fiscal Years 1976, 1980, and 1985. While runs #1-3 have almost exactly the same number of pupils in the total County, these pupils are distributed differently by fiscal area, therefore requiring different facilities.

2. Operating Costs

Operating costs for the College were broken down into the County costs and the aid from the State as well as other revenues, particularly tuition and fees. A linear regression equation was derived from the College's projections of full-time equivalent enrollment

**Projected Full-Time
Equivalent Enrollment
«»
Montgomery College**



and the County funded operating costs in the proposed Public Services Program. A similar equation was developed for the non-county funded operating costs. The figures in the PSP show the proportion of County funding increasing from about 35% in FY 1976 to about 42% by FY 1981. The total operating costs were also shown increasing by about 50% over this time period of six years. The non-county funded operating expenditures were also included as revenues.

3. Capital Costs

The capital projects which were included in all of the five runs were all of the projects in the Capital Improvements Program except for the construction cost of the down-county campus. The first stage of the Germantown campus was also assumed to be constructed. The capital projects which varied according to enrollment projections were the proposed new down-county campus and future stages of the Germantown campus. The MUNIES model calculated when each stage of these two campuses would be needed based on enrollment projections and the existing capacity of the campuses as stated in the CIP. The present capacity including the first stage of the Germantown campus would be 10,900 full-time equivalent students. The capital costs for each of the future stages of the down-county campus and the Germantown campus started two years prior to the year in which the campus would be needed. The criteria used for building a stage of a campus was that the total system be at capacity and the part of the County in which the campus was located was over capacity by 1,700 students for the down-county campus and 2,800 students for the Germantown campus. The down-county campus was assumed to

serve the fiscal areas #1 and #2 primarily, and the Germantown campus served fiscal areas #3 and #4. The following table shows the years in which a stage of either the Germantown campus or the down-county campus would be needed:

Fiscal Year In Which a New Stage of Campus Needed

<u>Run</u>	<u>Germantown Campus</u>	<u>Down-county Campus</u>
1	1981	1979
2	-	1979; 1983
3	1980	1982
4	-	1980
5	1980; 1986	1979

The capital costs aside from the stages of the campuses were calculated out beyond 1981 which is the last year of the CIP. The yearly cost was determined for each run based on an annual average cost per full-time equivalent student over the period FY 1976-1981.

4. Non-Debt Expenditures & Revenues

The State aid for construction costs is included under non-debt capital expenditures and under revenues in the budget for the subsystem.

COMMUNITY DEVELOPMENT AND HOUSING SUBSYSTEM

A. Definition of Community Development and Housing

This subsystem consists of all the projects which are included in the adopted Capital Improvements Program (1976-1981) publication. In addition, the Housing Opportunities Commission and the Department of Community and Economic Development operating budgets as stated in the proposed Public Services Program have been reviewed in the study.

B. Methodology - Capital Costs

Capital expenditures for Community Development and Housing subsystem for the first six years (1976-1981) were not changed from the total costs outlined in the Capital Improvements Program. The level of capital costs did not vary with any of the five alternative growth assumptions.

During the latter part of the study period (1982-1985) an average per capita measure of the previous six-year capital expenditures was calculated and utilized in the computation of future capital costs.

C. Operating Expenditures

Operating costs for this subsystem for the first six years were developed using a linear regression model. For the Community Development and Housing subsystem, operating costs as a function of population was utilized in order to obtain a per capita expenditure measure in 1976. This ratio was inputted directly into the model and total annual costs for the five growth alternatives were calculated.

Future operating expenditures were obtained by utilizing a six-year (1976-1981) per capita measure which related expenditures to population and the result was spread over the remainder of the study period (to 1985).

An estimate of the growth factor which represented improved level of service was included in the analysis. The factor was derived by comparing activity data and operating expenditures as published in the Public Services Program. To determine this factor, a regression function of $Y = ab^X$ was used for each growth alternative. This curvilinear regression function estimated the service level growth rate per unit of demand. For this subsystem, the increase in operating costs per unit of population was estimated from the Public Services Program as projected for the period 1976 to 1981.

D. Revenue Estimates and Revenue Offsets

Revenue estimates for this subsystem for the first six years (1976-1981) were made from analysis of the PDF's which were included in the 1976-1981 CIP publication. To obtain revenue estimates for the period 1982-1985, it was assumed that the same level of financing would continue as was observed during the earlier phase of the study. Examination of the PDF's revealed that this subsystem derives the major portion of its revenues from County bonds. It receives 69.9% from County bonds. Federal grants and contributions account for the remaining share of the revenues. Both Federal grants and contributions were treated in the model as revenue offsets.

GENERAL GOVERNMENT AND MISCELLANEOUS SUBSYSTEM

A. Introduction

This subsystem is a catch-all for several elements of the County Government. The segments of County Government included are:

General Government - including the Courts, the County Executive staff, the County Council, etc.

Miscellaneous and Non-departmental expenditures

Environmental Protection (excluding Solid Waste)

Rescue Service

Fines, Forfeitures and Service Charges

Landlord-Tenant Affairs

B. Methodology - General Government

The operating costs of general government were determined for the five alternative growth allocations using a regression equation which predicted costs as a function of the total number of dwelling units. The linear regression equation was derived from the yearly total operating costs in Public Services Program and the number of dwelling units forecast in the alternative #1 allocations. The operating costs for the other growth alternatives were then calculated using the linear regression equation and the total dwelling units in the other allocations.

The capital program involved with general government includes the County office building, the County service

park, the Bethesda and Wheaton community service centers, the court house and several other less costly projects. The only project which was not included in all of the allocations was the Germantown community service center. This facility was included in the trend growth weighted up-county, alternative #3, and the high growth alternative #5. Capital costs beyond the time frame of the Capital Improvements Program were predicted by taking the average annual per capita capital costs for the six year period of the CIP and calculating total yearly capital costs from the yearly population total for each of the five alternatives. The existing County debt and the debt service payments on existing bonds were also included under general government.

The revenues associated with general government were primarily in the form of aid for the Wheaton community service center and for the County bus maintenance facility.

C. Miscellaneous and Non-departmental Expenditures

These expenditures are only for operating costs. These costs were determined in the same fashion as the operating costs for general government: a linear regression equation was derived from the operating costs in the Public Services Program and the number of dwelling units in the trend alternative allocation. This equation was then used to determine operating costs for the other growth allocations.

D. Environmental Protection (excluding Solid Waste)

Solid Waste was excluded from this functional system as it fits more closely with the other subsystems dealing with the environment. What was included here was only operating costs, and only those costs not associated with solid waste. A regression line was fitted to the data on total operating costs in the Public Services Program and total dwelling units

from the trend allocation. The equation for this line was used to determine the operating costs for the other allocations.

E. Rescue

The activities under this subsystem include the following:

- The Office of the Director which provides coordination to improve the effectiveness of the independent fire departments and rescue squads.
- Fire Prevention which essentially promotes public safety through fire code enforcement.
- Operations that provides support for those operating services required by the Fire and Rescue Department.
- Wheaton Rescue service that provides ambulance and rescue services.

All of these components were grouped and entered in the MUNIES program under one heading. Yearly operating cost for these combined activities was derived from the PSP as a function of the total number of households allocated to each growth alternative.

A growth factor for operating costs was calculated from the PSP by comparing operating cost/dwelling unit and using a linear regression equation.

The analysis also included a new rescue facility for Upper Montgomery County. The cost of land, construction and equipment was estimated by staff.

F. Fines, Forfeitures and Service Charges

These monies which are all revenues to the County, include all the fines and forfeitures for criminal, civil and juvenile court cases as well as library fines, and service charges for several items under general government such as motor vehicle tags, sheriff fees, circuit court etc. as well as public safety, public works and health service charges. The total per capita revenues for the County was determined for 1976 and then used to estimate these revenues for the five alternatives on a yearly basis.

G. Landlord-Tenant Affairs

Landlord-Tenant relations, rent control and apartment inspection are all included in this special revenue fund. It is a self supporting fund with its revenues coming from license fees on licensed rental units covered by the Landlord-Tenant Affairs law. Several major assumptions were made to calculate the costs for this program which differed from the assumptions in the Public Services Program. It was assumed in that document that the number of licensed units would remain the same from 1976 to 1981 and that the rent control law would not be extended after October 31, 1975. For the purposes of this analysis it was assumed that rent control would continue after the October 31, 1975 data and that the number of covered multi-family units would not remain the same but would increase depending on the allocations for each growth alternative.

Operating costs for this department were determined on a per unit basis for Fiscal Year 1976 and continued at the same rate per unit over the time period of this study. The Public Services Program also showed the per unit cost as remaining constant over time, after FY 1976 when the costs associated with rent control had been dropped.

As this fund is self-supporting by law, revenues were calculated on the same basis as operating costs using a constant per unit figure. There were no capital costs associated with this department.

OTHER FUNDS SUBSYSTEM

The Other Funds subsystem includes the Liquor Control fund and the Suburban District fund. The major importance of the Liquor Control fund on the County government fiscal situation is that the profits from this self-supporting operation are transferred to the general fund. These profits amount to approximately five million dollars in 1976. The Suburban District fund covers street cleaning, leaf collection and planting and maintenance of street trees, in the area of the County generally south of Rockville and Bel Pre Road. The total budget for the fiscal year 1976 is approximately 2.5 million dollars.

A. Assumptions

1. Liquor Control Fund

The net sales for the Liquor Control fund were calculated by determining the sales per dwelling unit from the future sales estimated in the Public Services Program and the number of dwelling units estimated in the trend weight growth alternative. A linear regression equation was calculated from this data and the equation used to predict net sales for each of the five dwelling unit allocations for the period 1976-1986. The profits to be transferred to the general fund were 10.5% of net sales as indicated in the Public Services Program.

The only capital project included in Liquor Control is the Liquor Warehouse which is funded from County bonds. This facility is presently under construction in the County Service Park in Shady Grove. The cost in FY 76 is \$2,403,000 in County bonds, and \$108,000

in County bonds in FY 77. Using a 20 year term and a 5% interest rate, the debt service for this facility amounts to about \$200,000 per year.

2. Suburban District

The operating costs for the Suburban District were determined using a linear regression equation on operating costs and dwelling units. The number of dwelling units within the Suburban District was obtained from the parcel file listing. The percentage of dwelling units within the Suburban District by fiscal area was held constant. Dwelling units were used therefore as a proxy for the miles of street which would have to be cleaned for which no data was available. The regression equation was then used to predict operating costs for each of the five growth alternatives. There were no capital projects associated with the Suburban District. It was assumed that the tax rate for the Suburban District would rise or fall as necessary to produce revenues equal to the operating costs since the Suburban District is a self-supporting fund.

CULTURE AND RECREATION SUBSYSTEM

A. Definition of Culture and Recreation

The Culture and Recreation subsystem is composed of the Library system and the Recreation system. The Library system consists of all the libraries--community and regional--which are currently listed in the Functional Master Plan for Libraries, and also includes all of the projects which were specified in the Adopted Capital Improvements Program, 1976-1981.

The Recreation system includes all of the projects from the adopted CIP publication (1976-1981). Recreation programs specified in both the School programs and the Park Division (Montgomery County Planning Board) were also considered.

B. Choice of Demand Bases

In the analysis of the Library system, circulation per population was chosen as the demand base. The estimate of demand was based primarily on data obtained from the Public Services Program document and from in-house population information.

To make this approach operational, a regression model was developed which estimated circulation as a function of population by each fiscal area. The regression equation yielded results which gave an R^2 of .887.

Alternative approaches were reviewed in the search for a reliable predictor. Key consideration was given to employing measures of total borrowers and total books in circulation, but due to the lack of reliable disaggregated

information, the decision was made to utilize per capita circulation measures rather than number of books per borrower.

There are several advantages in choosing circulation and population as the demand base: (1) it facilitated the development of systematic criteria and standards for service level population for regional and community libraries and bookmobiles; (2) it provided a determination for establishing need of new facility and renovations; (3) by using this demand base, it became possible to estimate per capita circulation costs for the County and for each fiscal area.

The estimator of demand for the Recreation system was based on the number of users per 1,000 population. The decision to use the above predictor stemmed from the limited available activity data presented in the PSP publication. This choice, however, permitted the use of previously obtained in-house information. To utilize this base, a linear regression equation was developed in order to estimate users in 1976 by the four fiscal analysis areas and this information yielded an R^2 of .958.

Alternative estimators such as percent of users by sex and by age cohorts were examined, but lack of adequate data made the results unreliable.

C. Capital Costs

Capital expenditures for the Culture and Recreation subsystem for the first six years (1976-1981) were unchanged from the totals specified in the Capital Improvements Program. The level of capital costs did not vary with any of the alternative growth assumptions.

However, during the latter part of the study period (1982-1985), an average per capita measure of the previous six-year capital expenditures was calculated and utilized in the computation of future capital costs.

D. Operating Expenditures

Operating costs for the Library and Recreation systems for the first six years were developed from two linear regression models. For the Library system, circulation was utilized as function of population and the results show an R^2 of .887. The objective was to estimate circulation in 1976 in order to obtain a per capita expenditure measure which gave operating costs/circulation in 1976. For the Recreation system, users as a function of population was employed and this allowed prediction of users in 1976. The result was used to obtain the following per capita measure:

$$\frac{\text{Operating Costs in FY 76}}{\text{Users in FY 76}}$$

The two ratios obtained from the Library and Recreation systems were inputted directly into the model and served to allocate operating expenditures annually.

To estimate future operating expenditures, a six-year (1976-1981) per capita measure which related expenditures to population was obtained and the result was trended out for the remainder of the study period (to 1985).

Included in the analysis was an estimate of the growth factors which reflected improved level of service. The factors were arrived by comparing activity data and expenditures as published in the PSP. To determine this factor, a curvilinear regression function of $Y = ab^x$ was

utilized. This regression estimated the service level growth rate per unit of demand. For the Library system, growth in operating costs per book circulated was estimated from the Public Services Program as projected for the period 1976 to 1981. Also, for the Recreation system, growth in operating costs/user was estimated from the activity and cost data shown in the PSP.

E. Revenue Estimates and Revenue Offsets

Revenue estimates for this subsystem for the first six years (1976-1981) were made from examination of the PDF's which were contained in the 1976-1981 CIP document.

To obtain revenue estimates for the period 1982-1985, it was assumed that the same level of financing as observed during the earlier phase would continue.

The Library system derived most of its revenue from the County tax rate. Also considered in the analysis was County bond revenues, the principal source of funds for the system as revealed by the PDF's. State and Federal government also provide a share of the funds. State and Federal grants were inputted into the model as revenue offsets. The Recreation system also receives a significant portion of their funds from the County but, in addition, the system raises monies in the form of activity fees, Kiwanis grants and the Recreation District tax.

M-NCPPC SUBSYSTEM

A. Data Sources

The source material used in the analysis of the Maryland-National Capital Park and Planning Commission includes the following:

- FY 76-81 Adopted Capital Improvements Program
- FY 76-81 Recommended Public Services Program
- A Bond Prospectus - M-NCPPC
- FY 76 Budget Tax Levy - Council Resolution

B. Capital Projects - Parks

The analysis of the Park subsystem is tied directly to the adopted FY 76-81 Capital Improvements Program. The Montgomery County Planning Board decided to enter the first six years of the program as direct data input for all alternatives while the remaining four years used the average yearly per capita expenditures of the first six years.

The M-NCPPC program essentially recognizes three levels of parks: local, regional, and special. These park categories are used as a guide in our analysis including the local park standards set forth by the National Recreation and Park Association. While the N.R.P.A. standards are useful for comparison purposes, the Planning Board judges that the National Association standards have all too often represented ideal criteria which do not necessarily provide the most effective measures of park needs.

C. Planning Department

The existing principal and interest per year, over the 10-year period is taken from the M-NCPPC - A Bond Prospectus. The proposed debt service is based on a 5 percent interest rate calculated over a 20-year period, of total capital expenditures. It was also necessary to estimate the tax rate to fund the budget of the Commission. For the fiscal impact, the Administrative Tax was combined with the Park Tax. The Land Acquisition tax was held constant at 1¢. The computerized parcel file was used to estimate the percent of the tax base in each Fiscal Area which is assessed M-NCPPC Tax class areas.

D. Operating Costs - Service Level Growth Factor

The operating cost of the Park component is based on total dwelling units. Staff felt that dwelling units served as a better guide of park needs than population. The assumption is that most park users do not go alone but go as families or groups.

The Administrative operating cost is also based on total dwelling units. The function of the Planning Commission is to essentially serve the household.

The growth factor is estimated from the Public Services Program, 70-75 data, comparing operating cost/dwelling units. The growth rate calculated for the Park and Administrative fund is at a rate of 1.1 percent and 1.0 percent, respectively.

E. Revenues

The estimates for Other Revenues was taken from the PSP and separate for both the Administrative and Park components.

FIRE SUBSYSTEM

The Functional Master Plan for Fire Stations served as the main guide in the allocation of capital projects to the five growth alternatives. The plan effort is designed not only to meet current fire protection needs, but to be a plan for the next ten years. A new project description form is added to the model when a new station location is recommended and when a capital requirement such as a renovation projected is needed. The Fire/Rescue Services budget is not included in the following analysis because expenditures for operation of this County service is paid out of the General County Operating fund. This service activity is grouped along with several other County functions and discussed later in the report.

A. Methodology

The four fiscal areas of analysis are grouped into two separate divisions. The down-county fire stations are grouped into fiscal areas #1 and #2, while the up-county stations are grouped into fiscal areas #3 and #4. The down-county division roughly follows the Consolidated Fire Tax District.

The demand for fire expenditures is determined as a function of the assessable base. The analysis undertaken uses one theoretical tax equivalency rate instead of separate rates for each of the many fire taxing districts. It is not a true tax rate. Existing fire stations within the consolidated district have a uniform tax rate per/\$100 of assessed valuation. The fire departments not included within the consolidated district constitute individual fire tax districts and have different tax rates. The operating expenditures are estimated annually by using the FY 1976 Fire District cost from the Public Services

Program as a function of the assessable base. It is assumed that the demand for fire protection will grow as the value of all real property grows.

From the PSP it was estimated that there would be a 4.5 percent growth rate in expenditures per dollar of property protected due to real and non-inflationary costs.

Not all of the County, however, comes under Fire Protection. The Damascus fire station which has no fire tax rate, is entirely volunteer, receives no funds from the County Government.

The analysis also includes a new rescue facility for Upper Montgomery County. The cost of land, construction and equipment was estimated by staff.

The chart below indicates the total number of new fire stations required by each growth alternative. From the table we see that the down-county areas require more stations per population because high-density areas mean greater travel time in delivery of personnel to the scene of a fire. Travel time and access vary with the nature of the area: built-up areas tend to have better roads over which higher rates of speed can be attained, and tend to have a greater variety of routes of access to a fire site. At the same time, built-up areas tend to have higher levels of traffic congestion and conflict, which tend to reduce safe travel speed of fire apparatus and to introduce bottlenecks into smooth travel to the scene of a fire. The reverse of this happens up-county where low density areas and limited road networks result in a larger service area and fewer fire stations.

Number of Stations Required

<u>Fiscal Areas</u>	<u>Growth Alternatives</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
1		1			
2	3	3	2	2	3
3	3	3	3	3	3
4					
Total	6	6	5	5	6

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